Class
Book

Practical Floriculture;

A GUIDE TO THE SUCCESSFUL CULTIVATION OF

FLORISTS' PLANTS,

FOR THE

AMATEUR AND PROFESSIONAL FLORIST.

BY

PETER HENDERSON,

AUTHOR OF "GARDENING FOR PROFIT" AND "GARDENING FOR PLEASURE."

JERSEY CITY HEIGHTS.

SCIENTIFIC & LIBRARY
RECEIVED
MAY 8 1882
U.S. Patent Office

THIRD EDITION. GREATLY ENLARGED.

ILLUSTRATED.

NEW YORK:

ORANGE JUDD COMPANY,

751 BROADWAY.

1882.

SB405
.H4942

Entered, according to Act of Congress, in the year 1878, by the
ORANGE JUDD COMPANY,
In the Office of the Librarian of Congress, at Washington.

By transfer from
Pat. Office Lib.
April 1914

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PREFACE TO THIRD EDITION.

Although the main rules laid down in the previous editions of "Practical Floriculture" have been but little changed, the 22 pages of new matter added in this edition have been written mainly as general answers to hundreds of questions that have suggested themselves to those already in possession of the first and second editions of this work. Our correspondence continues to give us the assurance that, even in the midst of the unprecedented depression through which we have passed in the last five years, hundreds of Florists have successfully established themselves in nearly every State and Territory in the Union, with the help of "Practical Floriculture." Nothing can be more gratifying than to hear of these successes, and I trust what has been added in the present edition may still farther conduce to them.

PETER HENDERSON.

Jersey City Heights, N. J.,
November 1st, 1878.

PREFACE TO SECOND EDITION.

It is five years since I wrote the first edition of Practical Floriculture. The business is a progressive one, and I find that to keep pace with the advancement in many points another edition is necessary. If the success of this edition proves equal to that of the first, I shall be abundantly satisfied. It gives me great satisfaction to know that my first work has been the means not only of helping thousands of those having a taste for floriculture to a better understanding of the subject, but that it has also helped hundreds of men, and some women, to drift into the pleasant and profitable occupation of Commercial Florists, and I have been the recipient of scores of letters from these giving the credit of their success entirely to "Practical Floriculture."

In this edition is added a short treatise on the Culture of Foreign Grape-vines under Glass, written by Hugh Wilson, of Salem, Mass., who is well known in that section as a most successful Grape Grower.

PETER HENDERSON.

Jersey City Heights, N. J.,
November 1st, 1873.

INTRODUCTION.

The very flattering reception given my recent work on Vegetables—"Gardening for Profit"—has induced me to again enter the field of horticultural literature and offer to the public what knowledge twenty years of varied and extensive experience has given me in floriculture.

The subjects embraced by floriculture are now so various and comprehensive, that the difficulty presenting itself throughout has been to compress the work into moderate limits, without omitting matters which it is requisite those looking for information should know. But in endeavoring to do so, it has been necessary to treat many subjects much more briefly than their importance deserved.

It has been my aim to make this book meet the requirements of the amateur and inexperienced florist, and in this I trust I have partially succeeded. To do so, I have had to give instructions on some subjects more in detail than will seem necessary to the experienced gardener; but he should know that it is not for such as he that a book like this is written. It is for the amateur who takes pleasure in the work of, or superintendence of, his own garden or green-house; or the unskilled florist in our country towns, who has no one to consult with or to copy from. With such I flatter myself that this book will be welcome, as filling a want that no work before written in this country has attempted to supply; for all previous works have been written for the amateur, or amateur's gardener; commercial floriculture in all has been entirely ignored.

The radical views advanced on some subjects will be scouted by many gardeners who have been trained, as I was, in the conservative schools. For some years I practised according to my early teachings, until increasing business and the dire necessity of more labor brought common sense to the rescue and enabled me to cut loose from prescribed rules to such an extent as now to produce better results, with half the labor, than was done a score of years ago. Had our practices in such matters been limited in their extent, or in the length of time they have been in use, we could not have advocated their adoption with such confidence. Such modes, differing from those of the "orthodox school," as we have described, have been in use by all successful florists of extensive practice in the vicinity of New York for the past twelve or fifteen years, and as "a tree is known by its fruits," so we say come and see the results produced by these methods, and judge whether or not they are worthy of imitation.

My own knowledge and experience being defective on a few of the subjects treated of in this work, I have had the pleasure to receive the assistance of friends who have attained special eminence in the departments on which they treat. The plans for laying out gardens, together with the descriptions, are by the late Eugene A. Baumann, Landscape Gardener, of Rahway, N. J.; that on the "Construction of Bouquets, etc.," is written by James H. Park, of Brooklyn, L. I.; the chapter on "Orchids," is by James Fleming, Bergen City, N. J.; and that on "Violet Forcing," by Norton Bros., of Dorchester, Mass.

PETER HENDERSON.

Bergen City, N. J.

PRACTICAL FLORICULTURE.

CHAPTER I.

ASPECT AND SOIL.

The Aspect of the Flower Garden, when choice can be made, should be towards the south, or south-east, and if sheltered by hills, or belts of timber, from the north-west, many plants and trees can be safely grown that could not otherwise succeed without that shelter. Such a situation also permits operations to be begun earlier in spring, and continued later in the fall, in some locations making the season from two to three weeks longer than if the aspect had been to the north or north-west.

The soil in flower gardening, as in all Horticultural operations, is the basis of success, and is of more importance even than Aspect or Location; and whether it is the man of wealth, looking for a site upon which to build, and surround his home with a flowery landscape, or the working gardener about to become florist, and venturing his hard earnings in a first essay in business, let him first be certain that old "mother earth," in the spot about to be chosen, is in such condition as will reward his labors with success. Soils are so varied, that it is difficult indeed to convey to the inexperienced by description, what the proper character should be. To say to the uninitiated,

that the best soil for all garden purposes is a sandy loam, not less than 10 inches deep, conveys very little information, unless he is first made to understand what a sandy loam is. The subsoil, or stratum of earth immediately underlying the top soil, or loam, usually determines the quality of the soil. If it be gravelly, or sandy, then the top soil will almost invariably be a sandy loam; but if the subsoil is of putty-like clay, then the top soil will usually be of the same nature, and be what is known as clayey loam. One great advantage usually in soils having a gravelly or sandy subsoil is, that the water passes off freely, rendering the expensive operation of draining unnecessary, while in all soils with clayey subsoil, draining must be done, and thoroughly, or failure will certainly be the result. Those most to be avoided are what are known as "thin soils;" these may be either of sand, gravel, or clay, being in many places little more than "subsoil," without its stratum of loam. No process of manuring or cultivation can ever bring such soils into a condition to compete with those naturally good; for be it remembered that manures answer only a temporary purpose, and exert no *permanent* change in soil. Our richest market gardens, when left untilled, relapse into their normal state in three years. Thus it is in many parts of the Southern States, that plantations are said to be "worn out" in a few years, while in fact it is simply the supply of food to the plants that has been exhausted, the organic matter formed by decaying leaves or sods having been expended by the crops.

Supply this want by fertilizers, and you again have the land in its primitive fertile condition; but this must be continued, or the crops will again show indications of the soil being "worn out," but quicker, of course, on a thin soil than on a deep one. Hence the importance of selecting, when a choice can be had, a deep soil, with a subsoil of sand or gravel.

CHAPTER II.

LAYING OUT THE LAWN AND FLOWER GARDEN.

The Lawn.—The preparation of the Lawn is usually preliminary to the laying out of flower-beds in grounds having pretensions to what is called Landscape Gardening. The preparation for the lawn is too often hastily and imperfectly made; it is the foundation of all subsequent operations, and if imperfectly done at first, the fault can never be remedied afterward. The first point is to get the grounds shaped to the desired grade, taking care in grading, that when hills are removed, sufficient subsoil is also removed, to be replaced with top soil; so that at least 6 inches of good soil will overlay the whole in all places. When the grading is finished, drains should be laid wherever necessary, then the whole should be thoroughly plowed, a subsoil following in the wake of the common plow, until it is completely pulverized. A heavy harrow should then be applied until the surface is thoroughly fined down; all stones, roots, etc., should be removed, so that a smooth surface may be obtained. The lawn is now ready to be sown; when the seed is sown, a light harrow should again be applied, and after that a thorough rolling given, so that the surface is made as smooth as possible. In the latitude of New York, the seed may be sown any time during the months of April and May, and will form a good lawn by August, if the preparation has been good; if sown in the hot months of June or July, a sprinkling of oats should be sown at the same time, so that the shade given by the oats will protect the young grass from the sun. Lawns are also sometimes sown during the early fall months with excellent results. For small plots, of course, digging, trenching, and raking must be done instead of plowing, subsoiling,

and harrowing, and when good material is at hand, and immediate effect desired, such plots may be turfed or sodded instead of being sown.

The mixture of grass seed best suited for forming lawns is composed as follows:

8	quarts	Rhode Island Bent Grass.
3	"	Creeping Bent Grass.
10	"	Red Top Grass.
10	"	Kentucky Blue Grass.
1	"	White Clover.
1	Bushel.	

From 3 to 5 Bushels are required per acre, according to the condition of the soil, more being required on a poor soil than on a rich one.

Laying out the Flower Garden.—In the vicinity of New York, the taste displayed in this matter is certainly not very flattering to us; compared with that shown in the suburbs of London or Paris, we are wofully behind. Our city merchants annually build hundreds of houses, the cost of which ranges from $10,000 to $50,000 each, but the flower garden surrounding the house is in nineteen cases out of twenty left to the tender mercies of some ignoramus who styles himself a "Landscaper," and who generally manages before he is through to make the proprietor appear to be utterly devoid of taste, if not actually ridiculous. A worthy of this stamp held kingly sway as a "Landscaper" in the vicinity of New York a few years ago, and has left behind him some wonderful specimens of his art; he was great on "Sarpentine" walks, as he called them, and had a true artist's horror of straight lines. It would have been useless for Euclid to have attempted to demonstrate that the nearest distance between two points was a straight line. Terry knew better than that, and curved accordingly. One of the most marked of his

efforts was made in behalf of a "shoddy" king who had built a splendid mansion in about the middle of a four-acre lot. The carriage drive entering at each side of the plot, was made in his best "Sarpentine" style, but the centre approach, a six-foot walk for pedestrians, started at a point in the centre of the block, and was twisted like a corkscrew until it reached the hall door. The portly owner submitted like a martyr for awhile, but eventually snubbed Terry's science, obliterated the walk, and got a more expeditious, if less artistic method of getting to his home; his dogs and children, having less reverence for Terry's art, had long before taken the initiative. But this is only telling what not to do, which perhaps is as necessary as to tell what to do in the brief space that this subject can be treated of in this work. The following remarks and drawings are by the late Eugene A. Baumann, Esq., of Rahway, N. J., whose ability as a practical Landscape Gardener was perhaps second to none in this country; as the thousands of acres of tasteful grounds laid out by him in this and adjacent States during the past twenty years will attest.

CHAPTER III.

DESIGNS FOR ORNAMENTAL GROUNDS AND FLOWER GARDENS.

DESIGN FOR A CITY OR VILLAGE LOT.

Figure 1 gives a plan for a city or village lot of 100x200 feet, fronting south, but without stable or carriage house.

The dwelling at 1 is supposed to be without area, or entrance to the basement and cellars from outside, but

with the water-table, or first floor, raised above the ground some five feet, and the earth from the foundations and cellars employed for a terrace, rising about two and a half feet above the ordinary level, which is understood to be some two feet above that of the public road.

This plan is entirely in the geometric style, or with straight walks exclusively, as we think that, considering everything, this arrangement is the most suitable for small lots.

What, indeed, is the best use to which to put so little room? Fruit trees, vegetables, and large pieces of lawn are not what are here required; fruit and vegetables the proprietor may procure at the market cheaper than he could raise them; lawns or grass plots would not be accessible for any amusement or exercise in damp or rainy weather. Therefore I consider well-made walks, that may be dry in the afternoon of a rainy day, much more needed for the promenade of persons, who, having been busy all day, require some exercise and fresh air in the evening. Fine shrubbery, flower-beds, and shade are also required.

In a planting of the right sort, it requires not much depth to form good belts to protect the place against the cold winds, or sometimes against cool neighbors.

A large display of flowers does not require a very large space of ground, and if plenty of flowers should be wanted, as is generally the case, their quantity may be increased by a judicious selection of flowering shrubbery.

For a more sheltered, shady walk, I should, in such a place, suggest a well-built arbor too, covered on top with out-door grape vines, and on the side towards the house with fine flowering climbers, or those that have good and durable foliage, such as Climbing Roses and Honeysuckles, the Clematis, Akebia, Virginia Creeper, Bittersweet (or *Celastrus scandens*), Wistaria Sinensis, etc., as permanent plants, which may be trained so as to cover the whole front; and then, for variety, of a dwarfer habit and cover-

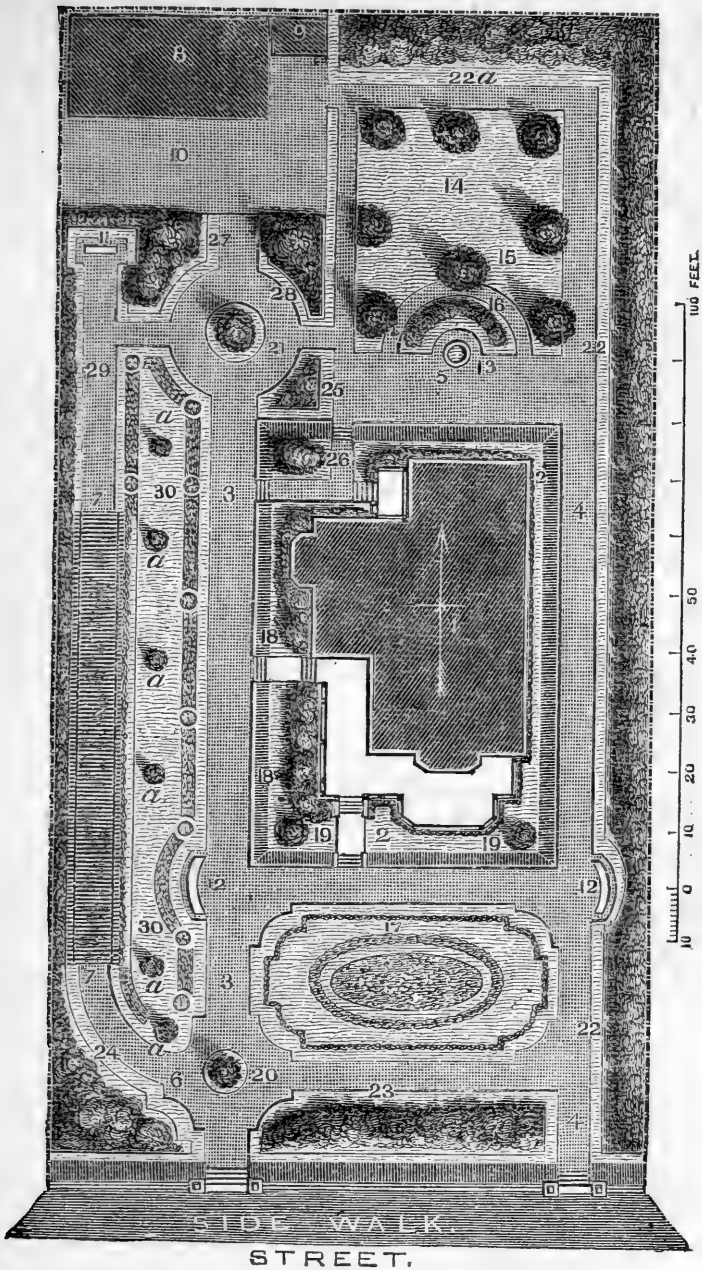


Fig. 1.—DESIGN FOR A VILLAGE LOT.

ing the lower parts, the Madeira Vine, Canary-bird Plant, and Adlumia. Some of the new Cucurbitaceæ, the broad-leaved Periwinkle, Ivies, and a number of other sorts, may be recommended.

I intend, in progressing with the explanation of the numbered objects of this plan, to give a list of such trees and shrubs as are required on a small place. It is a point which ought always to be considered, that trees and shrubs fit for a large place are not exactly suited to a small one, whatever may be their appearance or effect in the first four or five years; the mistakes are only seen in after years. Fortunately for the generality of the "landscapers," before the effect of their work is shown, the owner has removed to a bigger house, or the planting has been neglected and the trees have died, or the "landscaper" has found employment far away out West, caring very little how his *chef d'œuvres* in the East may look.

At 2 is the terrace, with the embankment. Small embankments ought to be of the most simple shape; any fancy outlines in the slope, on a small scale, will only be seen when the grass is freshly cut short, and they are therefore of no use. 3 is the main approach to the dwelling. (See scale for width.) At 20, in a small circle, it is intended to employ a fine bush of Pyrus Japonica, to interrupt the view from the street. 4 is a smaller walk, intended for the use of the family, but forming with the walk 3 a continuous circuit around the place. 5 is intended for a small yard in the rear of the house, with the well at 13. 6, a six-foot walk, passing underneath the arbor; a shady place in summer. 7, the arbor, with only spare room enough left in its rear for attending to the climbers and grape vines planted against it. 8, intended to be a shed for wood and other articles, besides a hen-house, with hen-yard, at 10. 9, office. 11, a bench, or resting-place. 12, benches, or even stone seats, in recesses. 14, a grass plot, to be used for a drying-ground, and also as

a play-ground for children, surrounded by seven deciduous shade trees, which might be, in preference, the Silver-leaved Maple (*Acer dasycarpum*,) a healthy, strong-growing, and clean tree. At 15, for variety of foliage, a Weeping-Willow. 16, a hedge-row of Siberian Arbor-vitæ. 17 is a flower-bed, with an outside border made of the small-leaved, trailing Juniper, or *Juniperus procumbens*. This magnificent plant, which, in small beds, forms the densest glaucous-green carpet, may be easily trained for a border by planting small young plants at 8 to 10 inches apart, and then guiding the main leader with small wooden pins in the direction of the border. It offers something entirely new in color and shape, and it is to be regretted that it is so little in use.

A second border, immediately around the flower-bed, affording a greater contrast in color, would be the small Tom Thumb Arbor-vitæ—a very precious novelty, too, on account of its very dark foliage.

At 18, on the north-west side of the house, there would be a very favorable location for a group of Rhododendrons and other so-called North American evergreen shrubs.

At 19, may be placed two single bushes of Calycanthus floridus, or, still better, two large vases or other pieces of statuary.

At 21, a circle, to be decorated with a purple Beech, or a good specimen of the Kilmarnock Willow.

At 22, all along the eastern boundary, a row of Norway Spruces, Balsam Firs, and American Arbor-vitæ, in the rear, planted at sufficient distance from each other to permit a second row in front of them (alternating), about 4 or 5 feet from the side of the walk.

In this front line ought to be employed Siberian Arbor-vitæ, Irish and Swedish Junipers, Golden Arbor-vitæ, Upright Yews, Retinispora ericoides, and Podocarpus.

At 22 *a*, in the rear of the play-ground, there ought to be the following shrubs, in three rows; for instance, in the

rear, the Venetian Sumac, Cercis Siliquastrum, and Cercis Canadensis, Double White and Red Flowering Thorns, American Mountain Ash, etc., etc., but no larger trees.

In the second row there might be planted (alternately) the Purple Hazel (or Filbert), the Halesia tetraptera, some Philadelphus, Euonymus, and Rose of Sharon.

In the third row, still smaller sorts, closing down to the edging, such as the Purple Barberry, Hypericum Kalmianum, Daphne Mezereum, Cotoneasters, Prunus Sinensis, and Prunus triloba. Herbaceous Plants, like Peonies, Iris, Phloxes, etc., etc., may be added, too, to great advantage.

At 23, the group near the front fence must be stocked with such shrubs as will prevent outsiders from troubling the privacy of the place, but low enough to allow the inmates to see the street from the piazza or first floor.

The following plants may best answer, viz.: Spiræa Reevesii fl. pleno, Spiræa prunifolia, and Spiræa callosa, Deutzia crenata fl. pleno, Cratægus Pyracantha (near each gate), and in front of these, towards the house, Hypericum Kalmianum, Deutzia gracilis, Spiræa Fortunii, and some herbaceous plants. 24, a corner group, ought to be filled in the rear with one or two Virgilia lutea, and in front of these there should be some five or six Æsculus macrostachya, a shrub of a remarkable fine effect.

At 25 and 26, the two small groups could be employed for Hydrangeas. 27 and 28 require, to hide the hen-yard, some taller shrubs of the following sort: the Californian Privet, some Lilacs, and the Golden Elder (*Sambucus nigra aurea.*)

The small border, 29, may be employed for some espaliers of Pears, Apricots, or Medlars.

30 is intended for flower-beds, arranged in the most simple way, and which ought to be filled in the fall with Dutch bulbs for the spring season, and in summer with fine selected bedding plants, of very distinct colors, but

each separate color in one strip; or with annuals, like Portulaca, Phlox Drummondii, Nemophilas, etc., etc.

At *a*, in Div. 30, there may be some Magnolias, a Cercis Japonica, and one Berberis macrophylla, or Japonica.

By mentioning exactly all the sorts of trees and shrubs that I might employ, I do not intend to say that the laying out may be a failure by employing other sorts, as corresponding varieties in size and foliage will answer just as well, but it will be noticed that I have mentioned no trees of large size, except along the eastern boundary and the play-ground. Indeed, of what use would it be to employ Sugar Maples, Elms, Norway Maples, and Sycamores, which after a few years would cover up half the width of the place, and leave no room for good shrubbery and flowers; allow no sun in the place, and even prevent the turf

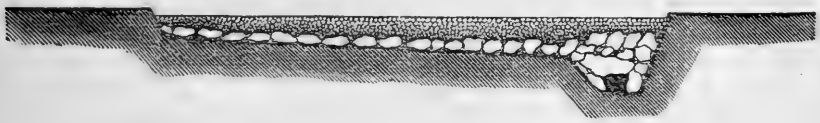


Fig. 2.—SECTION OF ROAD WITH SINGLE DRAIN.

from growing under their extended shade? It would be as sensible as to place in a small drawing-room a table, of which the four corners would touch the four walls.

In the selection of the right kind of plants is the whole secret of the art.

The walks in such a regular garden must be as well graded as possible, and on the same level as the turf, which ought not to overreach them more than 1 or $1\frac{1}{2}$ inch. Very narrow walks, unless the grass is frequently clipped, often look like ditches.

To establish such walks, if there is any drainage required, the digging out of the soil before stoning ought to be as clearly defined and done as well as the dressing of the top.

The best way to dig them out is, in general, for single drains, according to the diagram, figure 2, and where

double drains are required, I generally recommend the following system, shown in figure 3.

It will be seen by the first diagram that the bottom of the ditch represented in the cut is an inclined plane, running downwards from one side of the walk toward the opposite side to the drain, which I figure here simply as a stone drain. The stoning is to be laid uprightly, and never flat, on the hardened bottom of the ditch or dug-

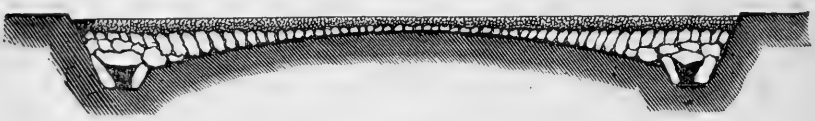


Fig. 3.—SECTION OF ROAD WITH DOUBLE DRAINS.

out trench; if laid flat, the stones will never bind together, but if upright, they will soon become tight by the intrusion of the gravel that has to be put on top of them.

The depth of the trench depends very much on the quality of the subsoil, and has to be regulated by it, and so with the ditch for the drains.

Such walks also depend very much on the quality of the soil, and very often, indeed generally, on the facility of procuring the materials.

In some places I have seen walks and roads made by simply scratching off three or four inches of light top soil, beneath which was gravel several feet deep. Such a road may be dry, but is very noisy, tiresome, and movable.

In other instances I have seen walks made by opening ditches over four feet deep, only for the sake of burying rocks and saving the soil found in digging; these form very fine drains, and help to clear the land of boulders and rocks, as is the case on top of Orange Mountain, N. J.

The second diagram (fig. 3) shows the section of a walk or drive requiring more drainage. The bottom between the two drain ditches forms a curving line, on which, if well placed, the stones will soon form an arch, and give the road all the qualities required.

The depth here is not as much regulated by the quality of the soil as by the width of the drive or roads. The more convexity given the bottom, the better for the absorption of the water by the drain, which ought to be at least 12 inches deeper than the extremity of the curve, whilst the top of the curve must remain at least 6 inches below the top of the road or drive.

Frequent raking, to remove the larger gravel or pebbles, and more frequent rolling during damp weather, are necessary for new walks.

If good clay is at hand, a thin coat of it may be put between the coarse and the fine gravel on top.

Gutters made of flagstone, or simply paved, will be needed only where there is a great descent and a large accumulation of water above, or sometimes even where the ground is very light and sandy, although the surface may slope but very little.

In uneven grounds, drives and walks are to be made in the same manner, but their finish and beauty will never depend upon themselves, nor upon the way in which they are laid down. An additional, correct grading of the grounds, right and left, so as to bring the sod everywhere at equal height over the gravel, and then a careful grading of the grounds 3, 4, to 6 feet off the margin, where the soil rises or falls, is indispensable in such cases to make a finished drive.

The staking out of such uneven walks, and the regular distribution of their grading, to avoid unsightly ups and downs, is a matter of taste and practice, ruled by the shape of the land and the direction of the walks.

DESIGN FOR A FLOWER-GARDEN.

We give in figure 4 (next page) a design for a regular flower-garden, intended for the ornamenting of the foot of a terrace, built in front of a large villa.

The terrace is intended to be of a heavy stone work, about three feet above the ground, with a projection in

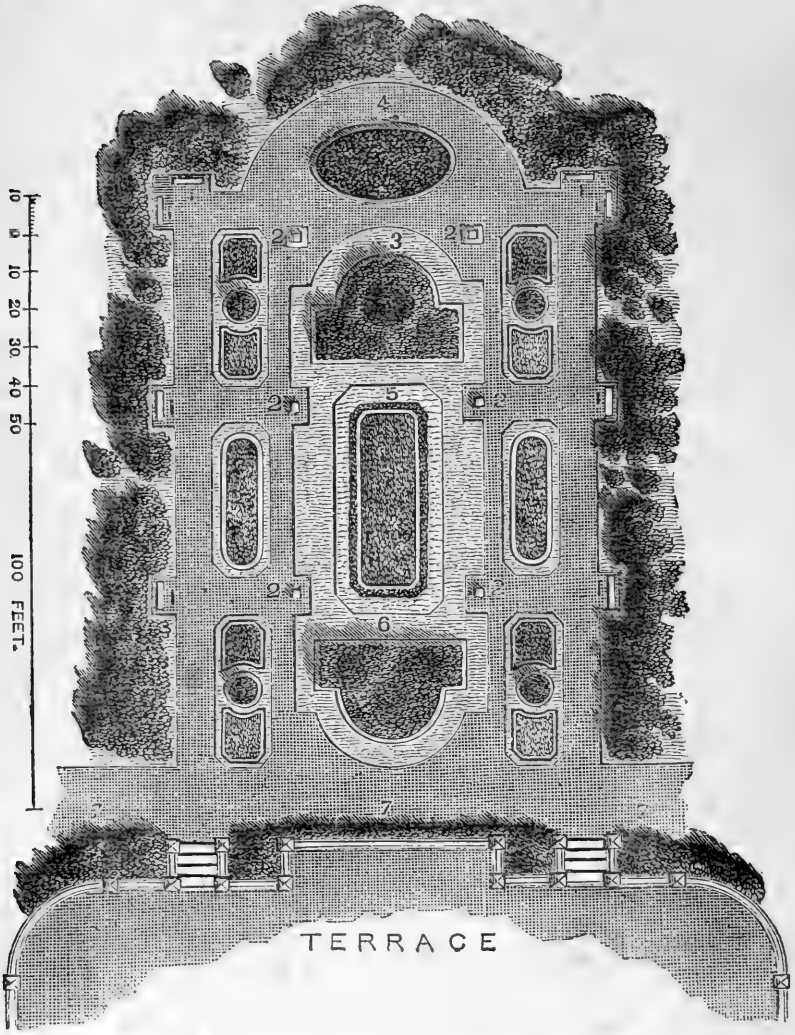


Fig. 4.—DESIGN FOR A FLOWER GARDEN.

the middle and two steps on each side, leading to the main walks in the flower-garden.

Such an arrangement, often seen in English villas, or in English designs, belongs only to large pleasure grounds, and may be considered as the real "dress ground."

This design has been expressly made with the view of keeping in order cheaply.

The lawn, or what is to be kept in sod, is as much as possible in regular straight lines, easily mowed with some of the patent lawn-mowers.

The walks are wide, as, starting from the bottom of the terrace, they will be overlooked the whole length from the top, and would appear scanty if not of liberal dimensions.

The place is intended to be kept as private as possible,—a sort of open-air saloon,—by a belt of selected shrubbery, and shade trees in its rear.

At 1, there are seats indicated in several recesses cut into the shrubs, the seats to be of heavy timber, as stone would be rather too cool, and iron or rustic work not looking architectural enough.

At 2, there are pedestals for pieces of statuary, or vases or large specimen plants in painted boxes.

At 3, 4, and 6, groups of Roses, bedding-out plants of broad, showy foliage, or flowering shrubs, such as Hydrangeas, which continue long in bloom.

At 5, the centre piece, there is a large flower-bed for Scarlet Geraniums, Feverfew, etc., surrounded by a border of Irish Ivy, kept in line, so as not to exceed 12 to 18 inches in width.

Such borders of Ivy, if employed in the right place, and well kept in order, are a magnificent ornament to a garden, and, according to their location, may be kept 3 and 4 feet wide. A very little covering in winter will keep the foliage, of the right sort, in very good order.

In the large squares, plainly sodded, that are in the gardens of the Louvre and the Tuileries, at Paris, there is no other ornament but such borders of broad-leaved Ivy, established at 3 to 4 feet from the walks, and left running about 2 to 3 feet wide; and they make, with the dark green or the lighter turf, a most striking show.

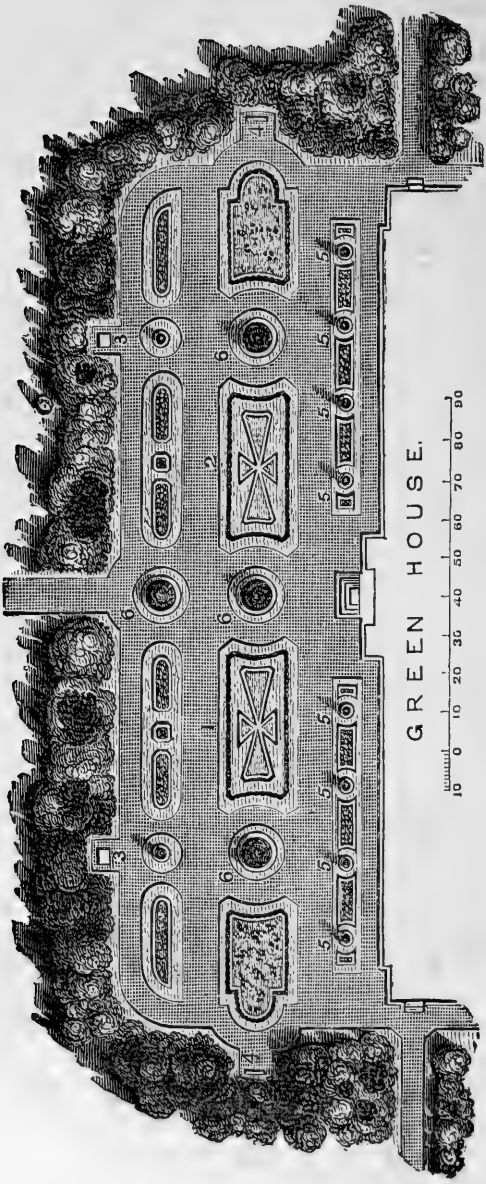


Fig. 5.—DESIGN FOR A PARTERRE.—*See page 25.*

At 7, on the floor of the terrace, and protected by the

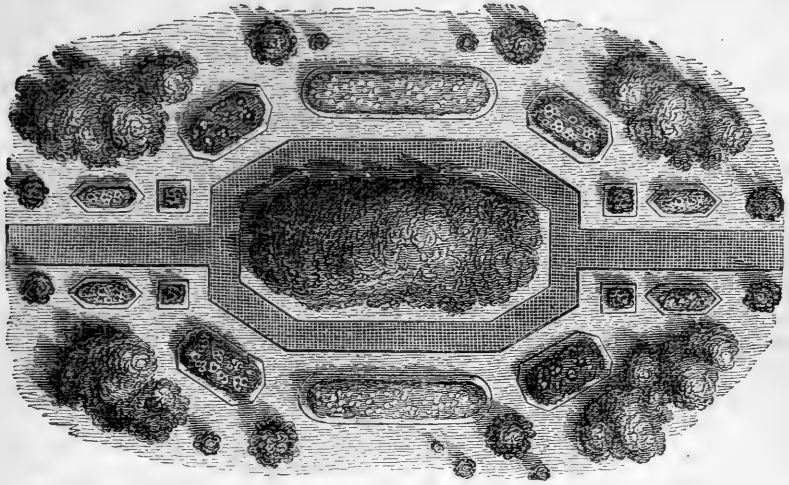


Fig. 6.—DESIGN FOR A FLOWER-BED IN A WALK.—(*See page* 27.)

shade of the balustrade, there will be a very good location for hardy Rhododendrons, and similar shrubs.

DESIGN FOR A PARTERRE.

The design (figure 5) represents a parterre to be

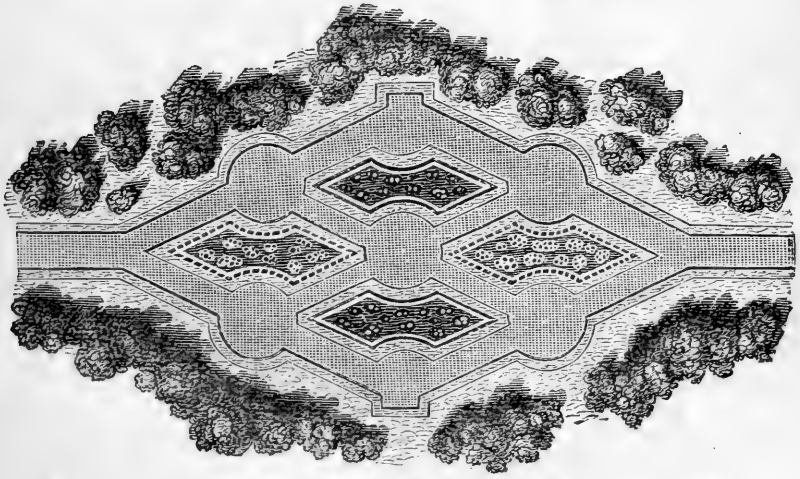


Fig. 7.—DESIGN FOR FLOWER-BED IN A WALK.—(*See page* 28.)

established in front of a large green-house, or conserva-

tory, and bringing together, in one single spot, all the flower-beds generally scattered over the lawn, on a large place. For privacy, it is surrounded by a belt of flowering shrubs.

Two principal flower-beds, at 1 and 2, are intended to be surrounded by a small evergreen border, kept for itself,

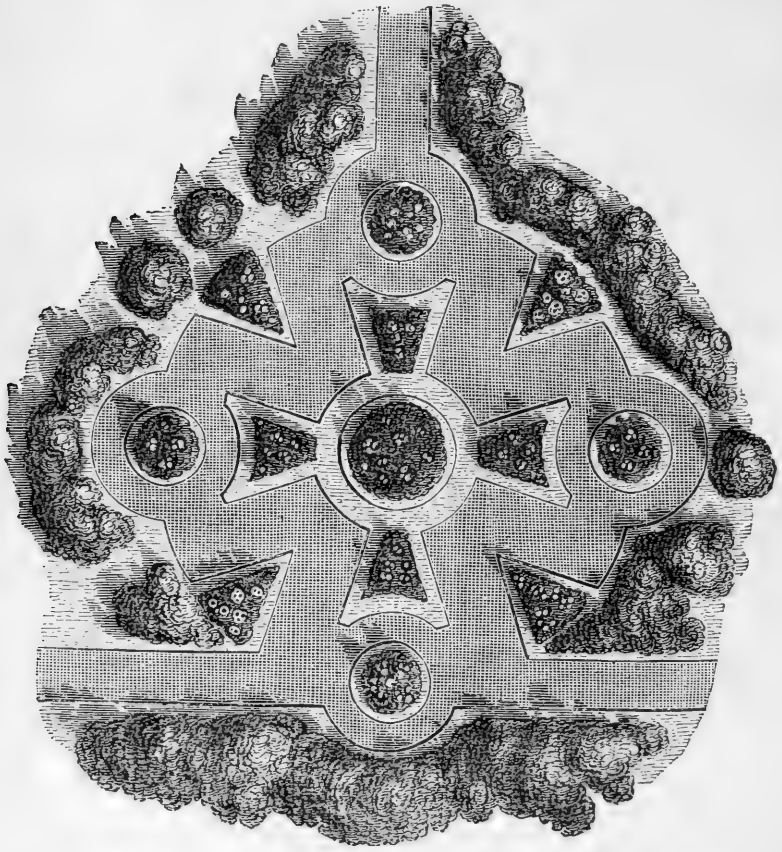


Fig. 8.—FLOWER-BEDS AT THE JUNCTION OF WALKS.—(*See page* 28.)

and not to be considered as an edging; small edging-box might answer best.

At 3, there are recesses for statuary, behind which the foliage ought to be of the darkest kind, to keep the white statuary well in sight.

At 4, similar recesses for seats of heavy timber.

At 5, in front of the green-house, alternating with the flower-beds, are single, upright-growing evergreens, symmetrically planted, such as Irish and Swedish Junipers, Taxus erecta, Podocarpus Japonica, Retinispora, etc.

At 6, single specimens of shrubs of medium size,

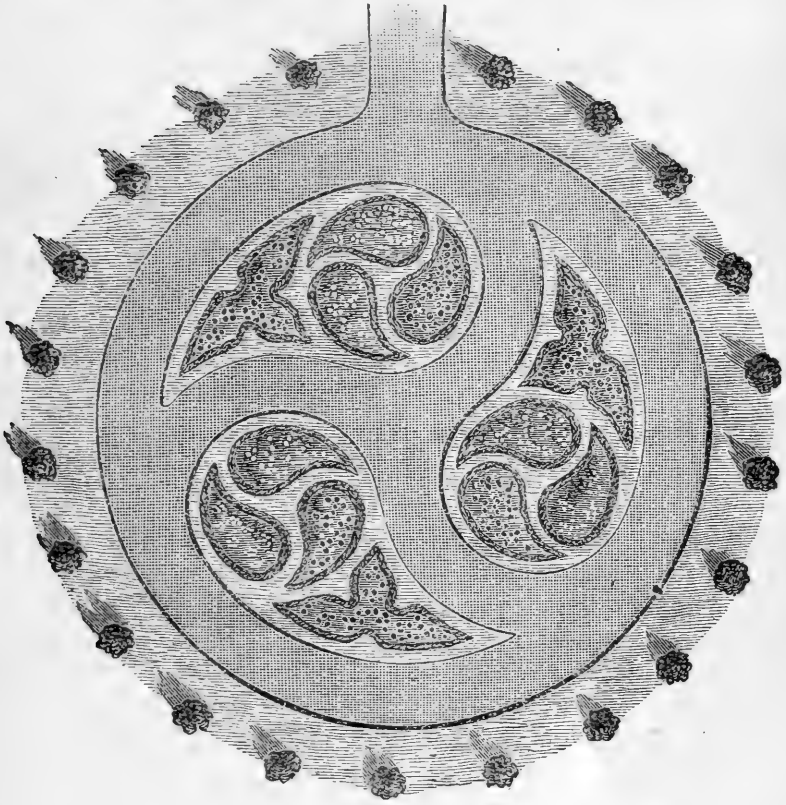


Fig. 9.—FLOWER-BEDS AT THE TERMINUS OF A WALK.

remarkable for their flowers, fragrance, or fine foliage; for example, Deutzia crenata flore pleno, Pyrus Japonica, Cratægus Pyracantha, or the Prunus triloba.

FLOWER BEDS IN WALKS, OR JUNCTIONS OF WALKS.

Figure 6 (p. 25), and the three following illustrations, are designs for introducing ornamental planting where oppor-

tunity offers along the course of a walk. In figure 6, the walk divides and passes each side of a bed of choice shrubbery, while the opposite sides of the walk are planted with some of the select shrubs already named, or others. By the judicious use of flowering shrubs, and the low-growing evergreens, very fine effects may be produced. In figure 7, is a similar but more elaborate plan, which allows of the introduction of flowers in masses; such an arrangement would be very appropriate for a rose-garden. In fig. 8, we have a design for ornamenting the point at which two walks unite at right angles. The planting may be of Ivy, Trailing Juniper, and other low-growing Evergreens, upon a ground-work of well-kept grass, or flowers may be introduced. In figure 9, we have a bit of ornamental flower garden at the terminus of a walk. What has been said of the selection of shrubs, etc., in describing the larger designs, will be a sufficient guide in carrying out these smaller plans.

CHAPTER IV.

PLANTING OF FLOWER-BEDS.

Much difference prevails in the modes of planting flower-beds, some holding to the promiscuous interspersion of the different plants, others to the ribbon or carpet style of planting, now so general in Europe. If the promiscuous system is adopted, care should be taken to dispose the plants in the beds so that the tallest plants will be at the back of the bed, if the border is against a wall or background of shrubbery, the others gradating to the front, according to height. In open beds, on the lawn, the tallest should be at the centre, the others grading

down to the front, on all sides, interspersing the colors so as to form the most agreeable contrast in shades. But, for grand effect, nothing, in our estimation, can ever be produced in promiscuous planting to equal that obtained by planting in masses or in ribbon lines. In the grounds of the Crystal Palace, near London, and at the Jardin des Plantes, in Paris, wonderful specimens of this mode of planting are to be seen. The lawns are cut so as to resemble rich green velvet; on these the flower-beds are laid out in every style that art can conceive; some are planted in masses of blue, scarlet, yellow, crimson, white, etc., separate beds of each, harmoniously blended on the carpeting of green. Then, again, the ribbon style is used in the large beds, in forms so various that allusion can here be made to only a few of the most conspicuous. In a circular bed, say of 20 feet in diameter, the first line towards the grass is blue Lobelia, attaining a height of 6 inches; next comes the famous Mrs. Pollock Geranium, occupying the space of 1½ foot wide and 9 inches high, with its gorgeous leaves and flowers; then, against that, is a line of Mountain of Snow Geranium, with its silvery white foliage and scarlet flowers, backed by the chocolate-colored Coleus Verschaffeltii; the centre being a mound of scarlet Salvia. Another style is a fringe for the front of the fern-like white-leaved Centaurea gymnocarpa; back of that is the Crystal Palace Scarlet Geranium; then Phalaris arundinacea picta, a new style of Ribbon Grass; next, Coleus Verschaffeltii, and, in the centre, a clump of Canna, or Pampas Grass.

During my visit to Europe last year (1872) I visited the celebrated Battersea Park, the most interesting, in a horticultural view, of the many parks in the neighborhood of London. A feature peculiar to Battersea Park is the subtropical and alpine planting, both of which as here done were to us a novel feature of landscape-gardening. It was interesting to see how common and rough-looking

plants were made to produce such wonderful effects when grouped and contrasted in the subtropical arrangement. The plants used were mainly Cannas, Japanese Maize (striped), Wigandias, Ferdinandas, Bocconias, Solanums, and many of the tall-growing sorts of Amaranths. These were grouped in beds of every conceivable form, some clearly defined on the broad lawn, some skirting the edge of a clump of trees, others planted in and among the trees and shrubbery as undergrowth, giving the impression when looking at it under the leafy shade of trees that you were viewing an undergrowth of the tropics rather than a piece of the most artistical planting of an English park. One particular spot, which will not soon be forgotten, is a ravine of considerable extent, well shaded by tall trees, where were planted immense plants of tree ferns, the stems covered with Lycopodium, so exactly as to resemble what would be their condition in nature. Behind these and against the blue sky stood out strongly some gigantic Palms, so that we had here again a glimpse of what an Australian or Indian forest might seem. In direct contrast to these was a hill, a miniature Alp, planted from base to nearly the summit with alpine plants of the rarest kinds, among which were largely interspersed Sedums, Sempervivums, and other succulents, in rarity and variety sufficient to give joy to a botanist's heart. On the peaks and in the crevices of this little hill was planted closely one of the most common native plants of Britain, *Antennaria dioica*, one of the Everlastings, having white foliage, and this plant easily conveyed the impression of snow on the hill-tops and in its gullies. Altogether, on this little mound of half an acre, were planted probably three hundred distinct species.

Then from this mound of botanical interest, the first turn brought us to a very different style of planting—the massing or ribbon style, or what would be more appropriately (as it is done here) called the "carpet style,"

for it often resembled just such patterns as would make a beautiful carpet. This style is meeting now with much opposition from Mr. Robinson, editor of the "*Garden*," and many others; but whatever may be objectionable to those whose conceptions of gardening are beyond this rectangular system, there is no denying the pleasure that it gives to the masses—as was apparent by the crowds admiring these flower-beds at Battersea Park, many persons being engaged in sketching the plans and taking notes of the varieties used to produce the effect. This park of Battersea contains only two hundred acres. Its natural beauties are far inferior to either our Central, of New York, or Prospect Park, of Brooklyn; but its judicious system of planting, which gives novelty and freshness at every turn, conveys to the visitor a lasting impression of pleasure that the plain, monotonous shrubbery and lawn of our New York parks can never give. The public parks in Britain or Ireland are the best schools of taste in floriculture the people have to model from; and so it should be with us, but with the few extremely limited attempts that have been made at the Central Park the past two years, there has been no ornamental planting of a public character in the vicinity of New York. Some fine examples of this kind of gardening may be seen in private grounds in the vicinity of Boston, and at Forest Hill Cemetery, at Roxbury, Mass., where the effects of massing may be studied to advantage. The climate of Boston is much less favorable for such planting than that of New York, yet it is followed with gratifying success.

For beds, at a distance, having a background of shrubbery, large and bright-colored foliage, or showy-flowering plants only should be used; of these, an excellent effect is produced by having Amaranthus sanguineus for the background, a plant of crimson foliage growing 6 feet in height; next that, Salvia Gordonii, with its scarlet feather-like flowers, attaining a height of four feet, fronted

by Dactylis glomerata variegata, one of the most beautiful variegated grasses, which grows some 2 feet high.

For narrow beds along the margins of walks, ribbon lines should be formed of low-growing plants, such as the white Lobelia Snowflake, for the front line, followed next by Tom Thumb Tropeolum; then, as the centre, or third line, Fuchsia Golden Fleece; as a second marginal line on the other side, Geranium Flower of Spring, with its white foliage and scarlet flowers, followed by a line of Lobelia Paxtonii.

CHAPTER V.

SOILS FOR POTTING.

I rarely pick up a work on floriculture but the matter of soils is treated of in such a way as to be perfectly bewildering to amateurs, if not also to professional florists. One authority gives a table of not less than 19 sorts! Whether these authorities practice as they preach is very questionable; some of them I know do not, but why they should thus write to mystify those they attempt to teach, can only be ascribed to a desire to impress their readers with the profundity of their knowledge on such subjects. Now, what is the effect of such instructions? Our amateur cultivators are disheartened, as such combinations are to them perfectly impracticable. The private gardener, perhaps, falls back on his employer, and ascribes the unhealthy condition of his plants to the effect of his not being able to procure such and such a soil, which, he says, is necessary for some special class of plants, and excuses his failures thereby. The young florist, beginning business in some country town, with restricted means, and with

limited knowledge of what he is undertaking, looks upon this august authority in despair, and his heart sinks within him when he knows that no silver sand is within a thousand miles of him, and he is told, without qualification, that it is necessary for his propagating bench, or as an ingredient in his potting soils. He begins without it, and as he will possibly make some failures, these failures are laid at the door of the soil or sand that he has been obliged to use, while the chances are, twenty to one, that they were not. Not the least satisfaction I have in writing this book is, that of being able to attempt the simplification of many of our operations to such an extent as to put the means of doing the work within reach of any one. Not the least simple of these operations is the preparation of our Potting Soil. We have, we may say, only one heap—a big one it is—but it contains only two ingredients, rotted sods, from a loamy pasture, and rotted refuse hops from the breweries, in about the proportion of two of the sods to one of the hops. The sods are cut during spring or summer, and laid, with grassy sides together, so as to decompose, and the heap is repeatedly turned until it becomes friable. The rotted refuse hops (one year old), or rotted manure, is then added, either at once or when the soil is wanted for potting. For small pots,—from 2 to 4 inches—we run it through a sieve of $\frac{1}{2}$-inch meshes, which thoroughly incorporates the parts; for larger pots, it is not necessary to run it through a sieve, unless, perhaps, for the sake of thoroughly mixing, it may be quicker to run it through a $1\frac{1}{2}$-inch screen or sieve. If the loam is rather clayey, we use more hops; if rather sandy, less than the proportion named. If refuse hops are not attainable, thoroughly rotted horse or cow manure will do nearly as well. From this mould heap the soil is taken in which our plants of every description are grown and flowered; we make no exceptions, unless in the case of the few fine-rooting plants, such as Heaths,

Azaleas, Epacris, etc. In potting these, we use about two-thirds of the decayed refuse hops, to one of loam; if the hops are not attainable, leaf mould from the woods will do, in lieu of the hops, for this purpose. Our general mould heap supplies the soil, alike for Bouvardias, Begonias, Carnations, Camellias, Chrysanthemums, Daphne, Dracenas, Dahlias, Fuchsias, Ferns, Gazanias, Gardenias, Geraniums, Hyacinths, Liliums, Lantanas, Petunias, Pansies, Roses, Tuberoses, Violets, and Verbenas. Whether plants show vigorous growth under this universal application of soil to their varied natures, our hundreds of patrons, who will be readers of this book, can attest. If any of the disciples of the old school doubt this, let them come and have ocular evidence of the fact. Our location is within half an hour's walk (or 15 minutes' ride) of the city of New York; our gates and doors are always open; visitors are free to go and examine as they choose. They will see our mould heap looming up like a miniature mountain; they will see hundreds of thousands of plants, natives of every clime, deriving their luxuriant growth from this one source. While ignoring the necessity of special varieties of soil, for special families of plants, I do not mean to say that plants may not be grown as well by the use of such different compounds as by ours; but I claim, as a whole, they can be grown no better, and that the advice to make use of these combinations is bewildering to the amateur, or inexperienced gardener, troublesome in its practice, and of no benefit whatever in its results. In proof of this, I have, on different occasions, received Camellias from half a dozen different growers in Philadelphia, hardly two of whom use the same soil, but all grow them well. So in the vicinity of New York, where the soil is varied at the different points, as much as soil can be; yet we see growers using very different compounds with equally good results, showing, as has long ago been satisfactory to me, that special soils have less to do with

the healthy growth of plants than the proper application of temperature and moisture. In cities having paved streets, we find the sweepings to be a most valuable ingredient, which may be used to advantage in lieu of refuse hops, manure, or leaf-mould.

CHAPTER VI.

TEMPERATURE AND MOISTURE.

Many young gardeners and amateurs flounder befogged, attributing failure of crops in the garden, or want of health of plants in the green-house, to bad seeds, uncongenial soil or fertilizers, when it is much oftener the case that the cause is of a totally different nature, and entirely within their control. A temperature at which seeds are sown and plants grown must be congenial to the nature of the variety, else success can not follow. In a temperature at which a Portulaca will vigorously germinate, a Pansy seed would lie dormant, or at least show a sickly existence, and *vice versa*. Nearly half of the Lima beans sown annually perish by being sown from two to three weeks too early, by the impatience of our embryo horticulturists. On the other hand, the colder-blooded Carrot or Turnip seed all but refuse to germinate in the sultry days of July. Seeds of Calceolarias, Cinerarias, Chinese Primroses, and Pansies, will germinate more freely and make better plants by delaying the sowing until the middle of September than if sown earlier. Many failures are attributable to want of knowledge of this fact, and, without question, laid to the charge of the seedsman.

The same necessity of accommodating the temperature

to the nature of a matured plant exists even to a greater extent than it does with the seed; and one of the main causes of want of success in cultivating plants under glass is a want of knowledge, or from carelessness in keeping a temperature unsuited to the growth of the plants. In ordinary green-house collections the fault is oftener in the temperature being kept too high than too low, for it is much easier, requiring far less watchfulness by the person in charge to keep up a high temperature. The injury done by this is gradual, and will not, like the action of frost on the plants, show in the morning. In consequence of this, we often see the green-houses containing Camellias, Azaleas, Pelargoniums, Carnations, etc., etc., sweltering under a continued night temperature of 60° or 65°, when their nature demands 15° lower.

It is true, we too often see collections of hot-house and green-house plants intermingled, and attempts made to grow them, which, of necessity, result in failure to one or the other. The temperature to grow, in healthy condition, Coleus, Bouvardia, or Poinsettia (hot-house plants) would not be likely to maintain Verbenas, Carnations, or Geraniums long in a healthy state. The same rules follow as to the propagating-house, showing the necessity, even in a greater degree, of observing the requirements of their different natures. Coleus, Bouvardia, Begonia, and Lantana root in a bottom heat of 75°, with atmospheric temperature of 65°, in ten days; at 20° lower they will not root at all, but will perish. Although cuttings of plants of a more hardy nature will root in some conditions of growth at this temperature, yet we prefer, to insure plants of vigorous health, that Verbenas, Carnations, Geraniums, Roses, etc., be rooted in a temperature at least 15° lower, both in the bottom heat and temperature of the house.

The subject is one that relates to so many varieties and different conditions of organism at the different seasons of growth, that it is impossible to convey to the inexperi-

enced what these varieties and conditions are; but my object is to impress upon young or inexperienced readers what I have long believed to be an important truth—that the supplying the proper conditions of temperature to plants under glass, according to their different natures and conditions, has as much, or more, to do with their welfare than any other cause; and that often when ascribing the unhealthy state of a plant to uncongenial soil or defective drainage, or the "damping off" of some favorite cutting to the way it was cut or the sand it was put in, the true and sole cause of failure was nothing more than condemning them to an atmosphere uncongenial to their nature.

Thus far, we mainly allude to temperature. Serious injury is often done to plants from a want of, or excess of, moisture. The old gardener with whom my first essay in gardening was made used to define the difference in dryness in plants as "dry" and "killing dry;" "dry" was the proper condition that the plant should be in, when water was applied, the surface indicating dryness by becoming lighter, but no flagging or wilting; but woe betide the unfortunate that allowed a plant in charge to become in the condition of "killing dry;" this in his eye was an unpardonable offence. "Killing dry" was, to some extent, really killing in such a collection as we grew, which consisted largely of Cape Heaths, Epacris, and other hard-wooded plants, which are easily killed outright by allowing their tender, thread-like rootlets to become dry; unlike soft-wooded plants, such as Geraniums, or Fuchsias, they have less recuperative powers, so that a "dry" that would kill a Heath would have only the effect to stagnate the growth of a Geranium, and bring the tell-tale yellow leaves that are certain to follow whenever such plants have suffered for a *lack or excess* of moisture. Although the effect of drying is, for the time being perhaps, less marked in a hard-wooded plant than in a soft-wooded one, yet the ultimate

effect is much more fatal. To the unpractised eye, a Heath that has been injured by drouth may appear all right, while it is gone beyond recovery. The old gardener before alluded to used to make his dead Heaths do excellent service in assisting him in some severe jokes played on his less experienced brethren. Specimen plants of Heaths were scarce, and in some sorts, very valuable, and if he succeeded in making a present of one of these dead plants to one of his less posted friends, it used to keep him in good humor for a week.

No plant should ever be allowed to flag or wilt for want of moisture, neither should it be watered until the necessity for water is shown by the whitening of the surface of the soil, particularly if in dull weather, or if the green-house is kept at a low temperature. As a rule, with green-house plants kept in a night temperature of 45°, with a day temperature of 60°, watering twice a week from December to March will generally be sufficient; on the approach of clear weather, with higher temperature in April and May, they will require daily attention.

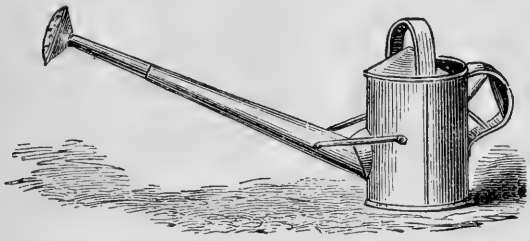


Fig. 10.—WATERING-POT.

Our practice is to water during winter with the common rose watering-pots, of the pattern shown in fig. 10, giving the plants water sparingly, or otherwise, as required. But as spring opens, we go at the operation more expeditiously, using a West's Force Pump (fig. 11), and 2-inch rubber hose. To the end of the hose is attached a heavy sprinkler, similar to that shown in the common watering-pot (fig. 10). In all districts where there is no hydrant-water, this means of watering will be found to be most thorough and effective. In my work, "Gardening for Profit," I

expressed the opinion that no labor-saving appliance we had ever used was so satisfactory as this; two years have passed since then, and, with increased work to do, we are still more than satisfied. One man pumps, another regulates the water and sprinkles it over the plants; each green-house, of 100 feet long by 11 feet wide, is watered thoroughly in 15 minutes; the changing of the hose from one house to another relieves the workman from the labor of pumping for a few minutes, so that when the change is made of the hose to another house, he is ready to start afresh again. By this mode of watering, we not only give the plants a thorough drenching, but we save at least three-fourths of the labor that is usually spent in watering with the watering-pot. Some may object to this rough-looking way of watering plants; to such we say, even with the danger of being thought to be puffing our own wares, come and look at the results of such rough work. We have now practised it for the past four years, and have lost thousands of dollars by not having done so from the beginning.

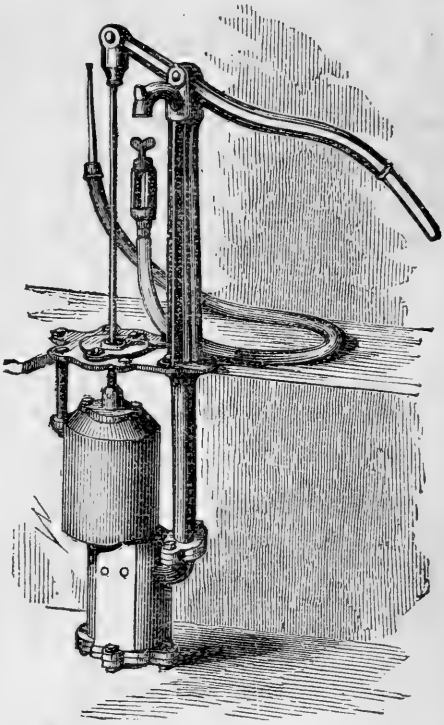


Fig. 11.—WEST'S FORCE PUMP.

Two rules are laid down by nearly all writers that I have read on floriculture, in reference to the water to be used for plants; one, that it must be rain, or at least "soft" water; the other, that the water should be of the

same temperature as the atmosphere in which the plants are growing.

To both these dogmas, I beg to respectfully enter my protest. Such dogmas are handed down from one to another, without one in a hundred of those who hold them having either the opportunity or inclination to test their truth by experiment. My green-houses, at Jersey City, for a dozen years, were entirely watered from a deep well of hard water, winter and summer, which might average in temperature 40°; most of my green-houses, now at Bergen City, are watered from cisterns inside the green-houses, from rain-water caught by the roof; yet we have never been able to see that our plants have been any better grown or healthier in one place than in the other. If any one will take the trouble to reason for a minute, he will understand why there is no necessity for this equality of temperature between the water and the soil. If we plunge a thermometer into the soil of a plant in the hot-house, it may indicate say 80°; if we pour a pint of water at 40° into the soil, the temperature will not be 40°, but about the mean between 40° and 80°, say 60°. Now if the soil remained for any length of time at 60°, it might be claimed to be injurious; but it does not. In 10 minutes it will become of the same temperature as before it was watered, or nearly so, by the absorption of heat from the atmosphere of the house. It is the *duration* of extremes of temperature that does the mischief; place a plant of Coleus in a temperature of 33° for 24 hours, and it will be almost certain to die, while it would remain as many minutes without injury. Let a dash of sun raise the temperature of your hot-bed to 100°, or over, for 10 minutes, and it will not seriously injure the contents, but an hour of this temperature might destroy the whole.

We pour ice-water into our stomachs at a temperature of less than 40°, with impunity, because but a few minutes suffices to bring it to the temperature it meets with there;

did we swallow a sufficient quantity to keep the stomach at the temperature of ice-water for any length of time, fatal results would follow.

A point indispensable in our hot and arid climate is, that all plants in the green-house should stand on close benches, overlaid with sand or ashes, or some such material. This keeps moist and prevents the plants from suffering, if any omission occur in watering. We know that the practice in many places is entirely different from this, the plants being stood on benches of open slat-work. No plant can be kept healthy in such a place, unless with at least double the labor of watering necessary with those standing on sand. This, like many other of our mistakes, is copied from the mode pursued in England, where a colder, moister, and less sunny climate may make it a necessary practice.

For this reason also, we prefer to use benches, or tables, instead of the stair-like green-house stage, which is now almost discarded

CHAPTER VII.

THE POTTING OF PLANTS.

The first operation of potting is when the rooted cutting is transferred from the cutting-bed to the pot. Almost without exception, plants of every variety, at this stage, should be placed in a 2-inch pot; occasionally some of the coarser-growing Geraniums may require the 3-inch size, from the fact of the roots being too large for the 2-inch; but there are few exceptions of this kind. The great mass of plants, when in the condition of rooted cuttings,

do much better in the smaller size, for the reason that the smaller mass of soil in the 2-inch pot allows the moisture to pass off quicker, and thereby prevents the soil from becoming sour, or sodden, which would be the case, more or less, if the cutting had been overpotted in a 3 or 4-inch pot. The operation of potting cuttings is very simple, and, in florists' establishments, is performed with great rapidity, average workmen doing 200 plants per hour. The pot is filled to the level with soil, a space made with the finger, in the centre of the soil, of sufficient size to admit the root, which is placed in the opening thus made; the soil is closed in again by pressing with the thumbs, close to the neck of the cutting, which firms the soil around the root; a smart rap is struck the side of pot with the hand, which levels the surface of the soil, and the operation is done. For nearly all the commoner kinds of bedding plants, such as Verbenas, Heliotropes, etc., cuttings in these 2-inch pots, if stood on tables, which are covered with an inch of sand, and occasionally moved, to keep the roots from pushing too far through into the sand, will grow in a healthy condition from three to four months, at least, at the cool season of the year, from January to May. But when plants are required to be grown as specimens, or of larger size for sale in spring, they must be repotted at intervals, as the condition of their growth demands; for example, to grow a Fuchsia of a height of 6 feet and 3 feet in diameter, a pot of at least 12 inches across at top, and 12 inches in depth, would be necessary, but it would not do to jump from the 2-inch cutting pot to this size at once; three or four different shifts are necessary to attain this end; these shifts should be made, as a general thing, not greater than from a 2-inch size to a 4-inch, and so on. I know that, a few years ago, considerable agitation was made in favor of what was termed the "one shift system," and fine specimens were exhibited by its advocates, to show its advantages. There

is no question that, in the hands of a careful and experienced man, it can be done, but it must necessitate much closer watching in watering, involving much more labor than the trouble of the safer plan of repeated shiftings. The time to shift a plant from a smaller to a larger pot is shown by the roots beginning to mat around the outer surface of the ball. It is not necessary to shift when the first roots touch the side of the pot; let them curl pretty well around the ball, but they must not be allowed to remain long enough to become hard or woody. They must be of that condition known to gardeners as "working roots," a condition not very easy to describe, unless to say that the appearance of such roots is white, soft, and succulent. We would think that the mode of shifting a plant from a smaller to a larger pot would soon suggest itself to the operator, even though he had never seen it done; but it is a little ludicrous to see the various absurd methods sometimes resorted to by our amateur friends to attain this very simple end. One proceeds with a knife and inserts it all around the sides of the pot, and thus scoops it out; another favorite way is to break the pot with a hammer. I have known many of our lady amateurs to practice these methods, who, no doubt, knew well how to turn a pudding or a jelly out of a form, but who did not think that the ball of earth enveloping the roots of a plant could be turned out of a flower-pot in the same way. In most cases, the slightest tap on the edge of the pot is sufficient to turn out the ball of earth. Soil, in depth according to the size of the plant, should be placed in the bottom of the pot, the ball placed in the centre, and the soil packed moderately firm in the space, either by the fingers or by a piece of stick made of suitable size for the purpose. When plants are first potted off, or shifted, they should be stood with the pots touching each other, if the diameter of the plant is less than that of the pot; but, as they begin to develop growth, the plants should be spread

apart, according to their size or development of foliage, to allow the air free circulation about the outside of the pots. The effect of this is most marked in the greenhouse, and teaches us a lesson as to the great necessity of the admission of air to the roots in all our operations, whether under glass or in the open field. If we pot off a lot of Fuchsias, Geraniums, or other large-leaved plants, with the pots touching each other, and place them in a temperature of 60°, in eight or ten days they will have grown so as to cover the whole space over, so that the pots can hardly be seen. Examine those in the centre of the lot, and it will be found that the roots that have reached to the side of the pot are few and feeble; but move a portion of the pots so that a space of an inch or two is made between each, to give the air a free circulation around the pots, and in six days after it will be found that strong and healthy roots will have been emitted by those that have been given the additional space, while the others left standing close have made little or no progress in root formation, and but a slender and weakly upward growth. The roots in the open field, could we see them in their unbroken state, as we can in turning out a plant from a pot, would show the same differences in vitality under corresponding circumstances.

It has often been a matter of surprise to many amateurs, and even professional gardeners, how it is that such extraordinary vigor and health are obtained in the plants grown by many New York florists, in pots that seem to be entirely inadequate in size for the support of such vigor. This is done by a practice not very generally known outside of this vicinity. When a plant shows by the condition of its roots that it requires a supply of fresh soil for its support, instead of shifting it into a large pot, it is taken out and the soil washed clean from the roots, and either placed back again in the same pot, in fresh soil, or in one of a single size larger.

This *washing* the soil from the roots, instead of shaking it off, has the advantage of leaving all the fibres or working roots intact, while by shaking the soil off the ball, the most valuable parts of the root are injured. Plants thus grown are particularly valuable for distant shipment, as a strong-rooted and vigorous plant is obtained without the necessity of shipping a heavy weight of soil.

The same practice is resorted to in another way, to effect a saving of freight in shipments. For many years we have sent to our patrons in the trade thousands of plants annually, every particle of soil being first washed from the roots; the plants, in all cases, arriving in as fine order as if they had been sent with the ball of soil around them, and saving at least nine-tenths of the freight.

This practice, however, is not proper, unless the season is early enough for the plants to have time to become established in the pots, and it is not prudent to do so later than March. If the weather is hot, more care is necessary in shading the plants until they have begun to root in the new soil.

I have never yet seen any writer on floriculture but who, in his instructions on the potting of plants, reiterates the cry of his predecessors about the imperative necessity of *draining* pots, in the operation of shifting or potting plants. This draining process is performed in various ways, according to the school in which the operator has been trained, or whose book authority he has taken as his guide; one simply places a piece of potsherd, or crock, over the hole in the bottom of the pot; another goes at it more elaborately, placing large pieces below, and grading off with finer ones, to the height of 2 or 3 inches; another finds great virtue in charcoal, as a drainage, used in the same way; another knows that oyster-shells, for that purpose, cannot be excelled, and practices accordingly.

Now fifteen years' extensive practice in the growing of plants, *without* the use of crocks, charcoal, or any other

substitute, has led me to believe that the system is utterly wrong in theory and perfectly useless in practice.

It is wrong in theory, for I contend that the escape of moisture or draining from the flower-pots takes place, in a very slight degree, from the bottom, but almost entirely from the porous sides of the flower-pot. Every gardener knows how quickly the soil gets *sour* in a glazed, a dirty, or a hard-burned pot, let him drain or crock it as he will, and that yellow leaves and a sickly growth quickly follow. If the patient is not too far gone, removal from the glazed pot to one of proper texture will quickly recuscitate, even if the draining or crocking is dispensed with. Whenever we wish to recuscitate an unhealthy plant, we wash the soil from the roots and pot in a *new* pot, where the drainage is perfect from its porous sides. What better evidence can be given than this universally known fact that the theory of the operation is wrong? Whether this sufficiently proves the theory of the operation to be wrong, may be questioned by some, but that the system is useless, utterly useless, in our practice, cannot very well be questioned. It is upwards of fifteen years since I utterly dispensed with the use of the so-called draining of pots; in that time some *millions* of plants have been grown by us, and few will say, from the appearance of the plants, that they suffered by the deviation from the orthodox system.

In our annual importations of English novelties, at prices often double their weight in gold, the pots always come filled one-third up with the inevitable potsherd. Little reverence is had for this labor of poor John Bull; the smallest boy in our establishment learns to sneer at him when he sees the drainage dispensed with, and the pampered $10.00 novelty growing vigorously under our radical *régime.*

"Ah! but" exclaims some dyed-in-the-wool old fogy, "it's all very well on your Roses and soft-wooded plants; dis-

pense with your crocking in growing Azaleas, Heaths, Epacris, Camellias, and you will soon see how it will result." Now if my theory is correct that the plant drains from the sides, and not from the bottom of the pot, the variety of plant has nothing to do with the matter, and for that reason it makes no difference what is the size or what the kind of plant grown, be it 6 inches or 6 feet, be it a Scarlet Geranium or an Orchid. But though I do not grow them now, I have grown Heaths, Camellias, and Azaleas, without crocking, just as creditably as we grow anything else. Heaths particularly, at one time, we grew largely, supplying them to the trade in large quantities, for winter flowers. I am glad to know that nearly all the larger florists' establishments thoughout the country have abandoned this useless practice. I do not know one in the vicinity of New York but where it is ignored, unless, perhaps, when in growing large plants of Roses or Camellias in boxes or tubs; but, in such cases, there is not much chance for admission of air or evaporation from the sides, and, to compensate for this, the box or tub is usually filled with potsherds or charcoal to one-third its depth. And, again, perhaps when pots too large for the size of the plant are used, drainage to one-third the depth is employed to counteract the injury that would be done by too great a mass of soil around the roots. That plants are grown as well in our florists' establishments here as they are in England, there is but little question. If the specimens of plants that we import annually are fair examples, we think far better, although I do not mean to say that the use of crocks is the difficulty; but in these large European establishments the proprietor is apt, in many cases, to get above his business, and leave it to the care of his subordinates. One great bar to changes is the easy maxim, that we are all apt to hold, "Let well enough alone." This, perhaps, is what makes thousands excuse themselves for what I think is an

utterly useless practice in this case. Throwing a handful of potsherds into the bottom of a pot will certainly not injure the growth of a plant, neither would a gold dollar, but neither would do any good; the dollar would have bought something, and so would the labor thrown away in this useless operation.

An old farmer, in planting a peach orchard, in one of the inland counties of this State, was informed by some obliging neighbor that it would greatly improve their growth if he would place a shovelfull of small stones under each tree; as chance would have it, the soil and climate being suitable, the orchard was a success, and to this day no man is supposed to know any thing about planting peach trees in that neighborhood unless he knows sufficient to place a few stones under the roots! Most of our gardeners would laugh at these credulous farmers, but to my notion, it is not one whit more absurd to place a shovelfull of stones under a peach tree than it is to throw a handfull of potsherds into the bottom of a flower-pot before potting the plant.

The amateur, in potting his plants, will find it necessary to place something over the hole in the bottom of the pot, not for the purpose of drainage, but to prevent the soil from shaking out. The hole may be covered with a bit of broken pot, an oyster shell, chip, or whatever is at hand.

EXPERT GARDEN WORKMEN.

In my long experience with workmen I have observed that, other things being equal, the man who could move his hands quickest, was almost certain to be the man most successful in life. Rapid movement of the hands in such light operations as writing or type-setting argue quick

mental decision, and if such a mind is well-balanced, its possessor is more likely to distinguish himself than he who moves more sluggishly. Now, two-thirds of all garden operations—particularly those of flower-gardening—are as light as either writing or type-setting, and for many years I have taken great pains to stimulate my workmen to rapidity of movement in all our light work, and it is astonishing what the gain in labor has been in this particular. For example, the average work of a man planting cabbage or lettuce plants, when we began market-gardening, did not exceed 2,000 a day; now, and for many years past, a man, with a boy to drop the plants, will set 6,000 a day, and one of my old foremen, John Scarry, now gardener to Dr. Thos. Vail, of Troy, N. Y., has repeatedly planted 10,000 in a day. In the lighter work of our green-houses rapid movement is even of more importance, and the rivalry among our workmen for distinction in this matter is of great benefit to themselves as well as to us. The acknowledged champion, at present, of our whole force of forty men is a young Irishman named James Markey. Jim, though not yet 25, has been with me a dozen years or more, and from the first has distinguished himself for doing all light operations quicker and better than any boy of his years, and probably to-day can make more cuttings, or pot more plants, in the same space of time, than any other man in America. It is very good average work for one man to pot off in 2½-inch pots 2,000 cuttings in ten hours. Jim potted off one day of ten hours, this spring, 10,000, while his average work of this kind is 5,000 a day. Of course, such ability commands its price, and Jim is paid quite twice that of most of his fellows, and is much valued by me as an example well worthy of imitation.

CHAPTER VIII.

COLD FRAMES.—WINTER PROTECTION.

Many of the plants used for the decoration of the flower borders in summer may be kept through the winter in what are termed cold-frames, or sunken pits. These are formed by excavating the earth about 2 feet deep and of a width to suit the usual 6-foot sash, and of such length as may be required. The sides of the pit are boarded up, on the front or south side, to a height of 8 or 10 inches, and at the back or north side, some 6 inches higher, to give the necessary slope to carry off the water from the sashes and to better catch the sun's rays. Thus formed, the frame will measure about 3 feet deep from the sash in front and about 3½ feet at the back. Or, if the work is desired to be permanent, the sides may be built of brick instead of boards.

Above all other considerations, the place where the pit is built must be free from standing water, and if not naturally dry, must be drained so as to carry off the water. Whenever practicable, the situation should be warm and well sheltered, as such a position will save a great deal in winter covering. In such a pit tender Roses can be kept in the best possible condition, better, in our opinion, than in any green-house. If kept in pots, (which is the best way to keep them) the pots should be plunged to the rim in sawdust, leaves, tan bark, or some such light material. Besides Roses, the plants embraced in the following list may be wintered over with safety, provided that care is taken to admit light and air, whenever the weather will permit. The pits must be thoroughly covered up at night with mats and shutters; this, if well done, will keep

the plants from freezing injuriously in any district where the thermometer does not fall more than 15° below zero.

Azaleas,	Pentstemons,
Antirrhinums,	Verbenas,
Carnations (Monthly),	Stock Gilliflowers.
Camellias;	Wallflowers.
Fuchsias,	Roses of all kinds.
Geraniums,	Pinks, (Florists'.)

Plants to be kept over in frames should be potted at least a month previous to the setting in of cold weather; all had better be well established in the pots before the middle of November, and until that time the plants should be fully exposed to the light and air, by the entire removal of the sashes, unless on unusually harsh and cold days. From the middle of November to the middle of March but little watering will be required. In cases of severe snow-storms, the pit may remain covered up, if the weather is cold, for a week at a time, without exposing the plants to the light, and Roses, Camellias, or Azaleas, in a dormant state, may remain even a month; but, as before said, whenever practicable, admit light and air. For out-door protection of Roses, see chapter devoted to them.

To amateurs we would say that many plants may be saved in a dry, cool cellar much better than they can be kept in most sitting-rooms. The plants that can be best kept during winter in the cellar are Carnations, Fuchsias, Geraniums, Roses, Lemon Verbenas, and Dahlia roots. If the plants are to be lifted from the ground, cut away all strong-growing shoots; in the case of Geraniums or Fuchsias, cut them well in, and plant them in shallow (9-inch deep) boxes of soil, keeping them exposed to the open air as late as the weather will permit. This can best be done by taking them into some shelter at night and exposing them to light and air through the day; this will harden them to endure their winter quarters in the cellar. Once placed in the cellar, if cool and moist, as cellars

usually are, no water should be given until they are again moved out to the light in May. Remember that thus immersed in the dark cellar in their dormant state, water or moisture would injure them beyond recovery, unless they have become unusually dry.

CHAPTER IX.

CONSTRUCTION OF HOT-BEDS.

The most economical way of making hot-beds is to place the manure in pits made in the way described for Cold Frames, except that they may be made a foot or so deeper, so as to admit at least 18 inches of manure. The heating material for hot-beds is usually horse-manure, but refuse hops, leaves from the woods, or tan bark, will answer nearly as well when one is more readily attainable than another.

Whatever material is employed, it should be thrown into a heap of sufficient size to generate heat, and repeatedly turned until the rank heat has been expelled, which will usually be done by turning twice. The mass will be in the proper condition to be put into the pit in eight or ten days from the time of starting with the raw material. In spreading it in the pit it should be firmly trodden down to the depth of 18 inches, so that the heat may be longer retained. If the hot-bed is to be used to receive plants in pots, a covering of 4 to 6 inches of sawdust, in which to place or plunge the pots, should be put over the heating material. If the bed is to be used for the sowing of annual or other seeds, a covering of 6 inches of light soil should be put over the manure. Before placing plants or sowing seeds in the hot-bed, plunge a thermometer in the bed, and when the heat begins to *decline* from 100°

then operations may be begun with safety. But for whatever purpose a hot-bed is used, in all such latitudes as New York, the bed should never be made before the first week in March; great risk is run if it is made much sooner with but little advantage in earliness. Greater caution is necessary in airing than with the cold frame, for with the hot-bed the heat from the manure, together with the sun's rays, will often run the temperature in an hour so high as to destroy its whole contents, if airing at the proper time has been neglected. Many a merchant doing business in the city has gone home in the evening to his country residence to find that his hot-bed, that had been his pride in the morning, had become a scorched brown mass at night for want of attention to the safety-valve of "airing." In such cases, when no competent person is in charge, the safest way is to tilt the sashes a few inches, even before the necessity arises, rather than run the risk of the sun coming out strong and destroying the whole. In a southern exposure, in a sheltered place, there is rarely danger in admitting air in most days in March or April from 9 to 4 o'clock. But, of course, judgment must be used in extreme cases. The greater heat in the hot-bed necessitates watering freely whenever the surface of the soil appears dry, which, in dry weather, if the heat is strong, will usually be every other day.

CHAPTER X.

GREEN-HOUSE STRUCTURES.

I have a peculiar pleasure in beginning to describe our present modes of constructing green-houses, well knowing that hundreds of my readers will turn with interest to this page, in the hope that they may be enlightened on a subject on which doubtless many of them have seriously

blundered. I have no reason to complain of success in business, but I feel well assured that for the first ten years of my time many thousands of dollars were sacrificed in the blunders made in my endeavor to get on the right track.

There was no fixed system; all was confusion, hardly two of us building alike, and, in my humble opinion, mos of us building wrong.

The style of green-house to be built must be governed by the purpose for which it is wanted. If for the growing of a general assortment of green-house or bedding plants, four years' working of those on the ridge and furrow system, on the extensive scale in use by us, makes us confident in the belief that that system is all we have previously claimed for it, as being *the most economical of space, most economical of heat, and most economical in cost of construction.*

Figure 12 represents the end section and ground plan of the style of house referred to, which may be used for the purpose of growing flowers for winter—Roses, green-house, or bedding plants, or anything requiring protection in winter. The green-houses represented in this plan are 100 feet in length, and each 11 feet wide inside. The heating of the whole (that is, the three measuring from the outside walls 36x100 feet) is done by one of Hitching's Combination Boilers (C), heating about 1200 feet of 4-inch pipe (D). The glass roof (E) is formed of portable sashes, each 6 feet by 3 feet; each alternate sash is screwed down, the others being movable, so that a full supply of air can be given when necessary.

The movable sash is elevated by an iron bar 15 inches long, attached to the sash by a staple; in this bar three holes are punched, at distances of 3 inches; by means of these holes the bar can be hooked upon an iron pin placed in the ridge pole, and thus hold the sash more or less open, to graduate the admission of air. When the sash

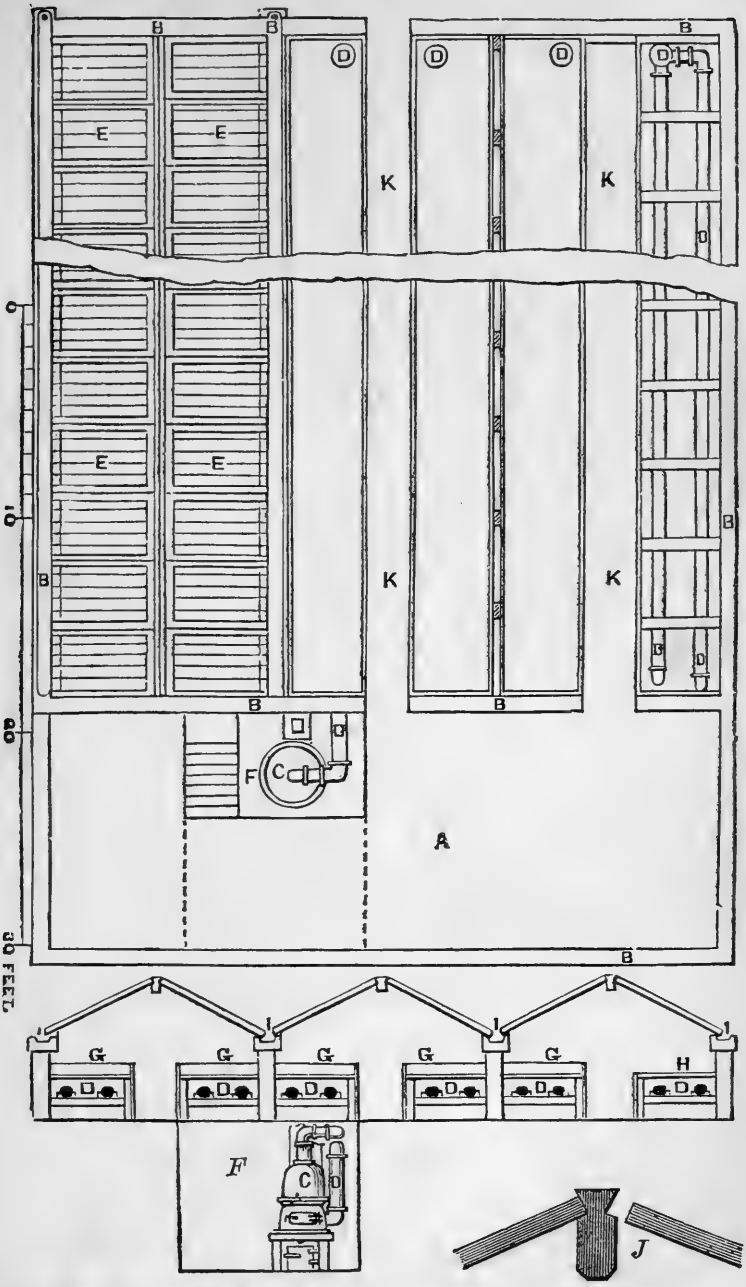


Fig. 12.—GREEN-HOUSE HEATED BY HOT WATER PIPES.

is shut down, the bar is hooked on to a pin that secures it in place, so that the sash cannot be moved by wind. I am particular to describe this method of airing, as it is, as far as our experience has gone, the best method we have ever seen used. The ridge-poles are cut out exactly as is shown at J, and the sash lays on the shoulder, braced by the angle shown in the cut. The interior arrangements are shown by the end section. G shows the bench, or table, as it is completed. The space beneath the bench, if bottom heat is required for propagating or other purposes, should be boarded up below the bottom of the pipes, the lower board being hinged, so that, in cold nights, additional heat can be given to the atmosphere of the house, if required. But for the general uses of growing plants, the benches must be left open below, so that the heat given out by the pipes will pass freely to all parts of the house. If one house is wanted at a higher temperature than the others, it will be necessary to board up along the posts from the ground to the top of the posts, and by wholly or partially shutting the valves in the pipes of the other houses, throw a greater heat into the one in which the high temperature is wanted. The walks through the house (K) are 2 feet wide, which leaves 4½ feet on each side for bench room. These widths we find to be the most convenient for the working of the plants; if narrower, too much space would be lost; if wider, the further side of the benches could not be reached easily.

The width of walk, however, must be determined by what the green-houses are designed for: if for workmen merely, 2 feet, or even less room, will do for the walk; but if visitors are to be accommodated, it should be at least 2½ feet in width.

A brick shed (A) covers the boiler pit (F), and is attached to the north end of the pits, the back wall being about 12 feet high, the front 8 feet, width 16 feet; besides breaking off the north wind from the green-houses,

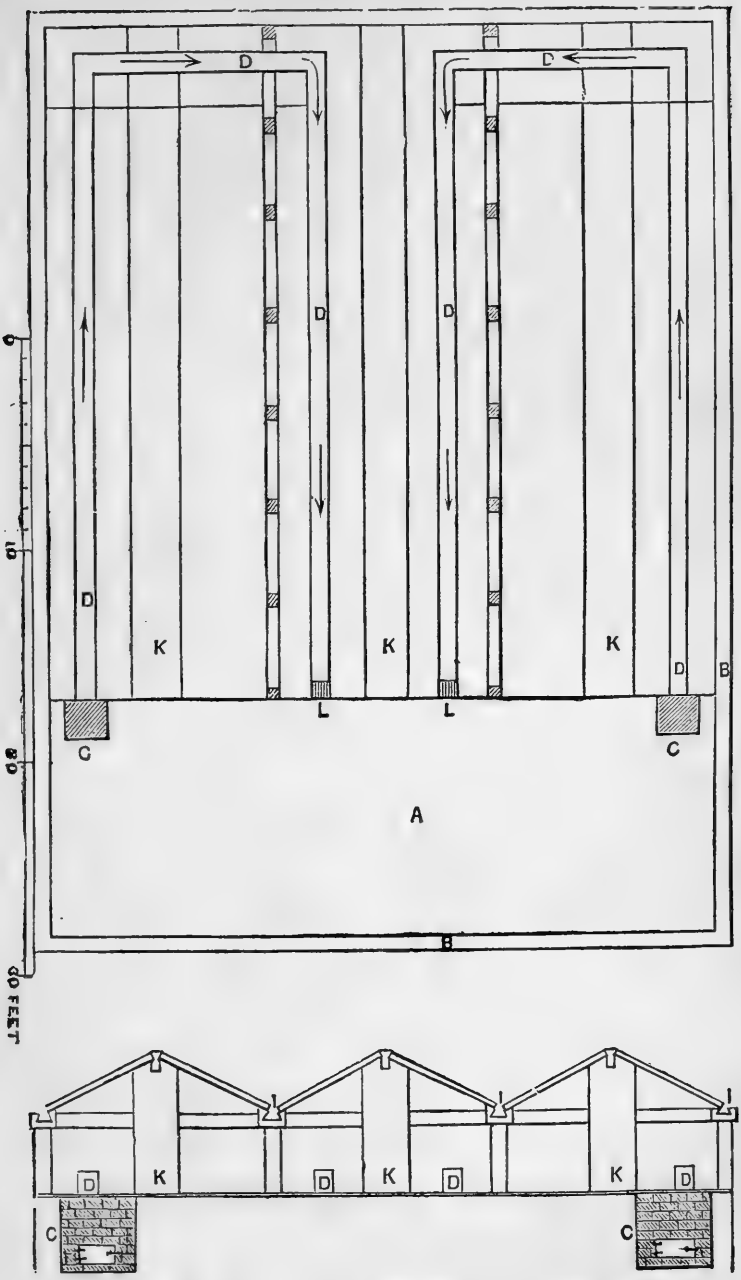


Fig. 13.—GREEN-HOUSE HEATED BY FLUES.

we find this shed indispensable as a potting and packing shed. It will be understood that these green-houses have their ends north and south; consequently one side is exposed to the east in the morning, the other to the west in the afternoon, while at noonday the rays of the sun strike directly upon the apex of the roof. There is nothing arbitrary in having the green-houses end north and south; a point to the east or west would not make any material difference, but, if circumstances will admit, we prefer them to end direct north and south.

At present prices, built in a plain, substantial manner, with the outer walls of brick or stone, and heated with hot water, they will cost about $10 per running foot, or $3,000 for the three connected; if put up singly, the cost would be at least 10 per cent more.

The smoke flues, as shown in figure 13, can be put up at much less cost—perhaps $6 per running foot, in most places; but when the heating is done by smoke-flues, the houses should not be, on an average, longer than 50 feet, varying, of course, with the locality; where the thermometer falls 10 or 15 degrees below zero, not more than 40 feet should be risked; while where the thermometer marks its lowest point at the same figures above zero, the houses may be extended to 70 feet.

It will be seen by this sketch that two fires only are used for the three green-houses; the flues from each, passing under the benches on the outside houses, are carried along the end and returned through the middle house.

This equalizes the temperature in all three, for, although the outside houses get only one run of flues each, these being nearest to the furnace give out just about the same amount of heat to the outside houses as the two returning flues give out in the middle one, as these, being at a greater distance from the fire, contain much less heat. This style of ridge and furrow building of green-houses is especially adapted for florists; hundreds of establishments have

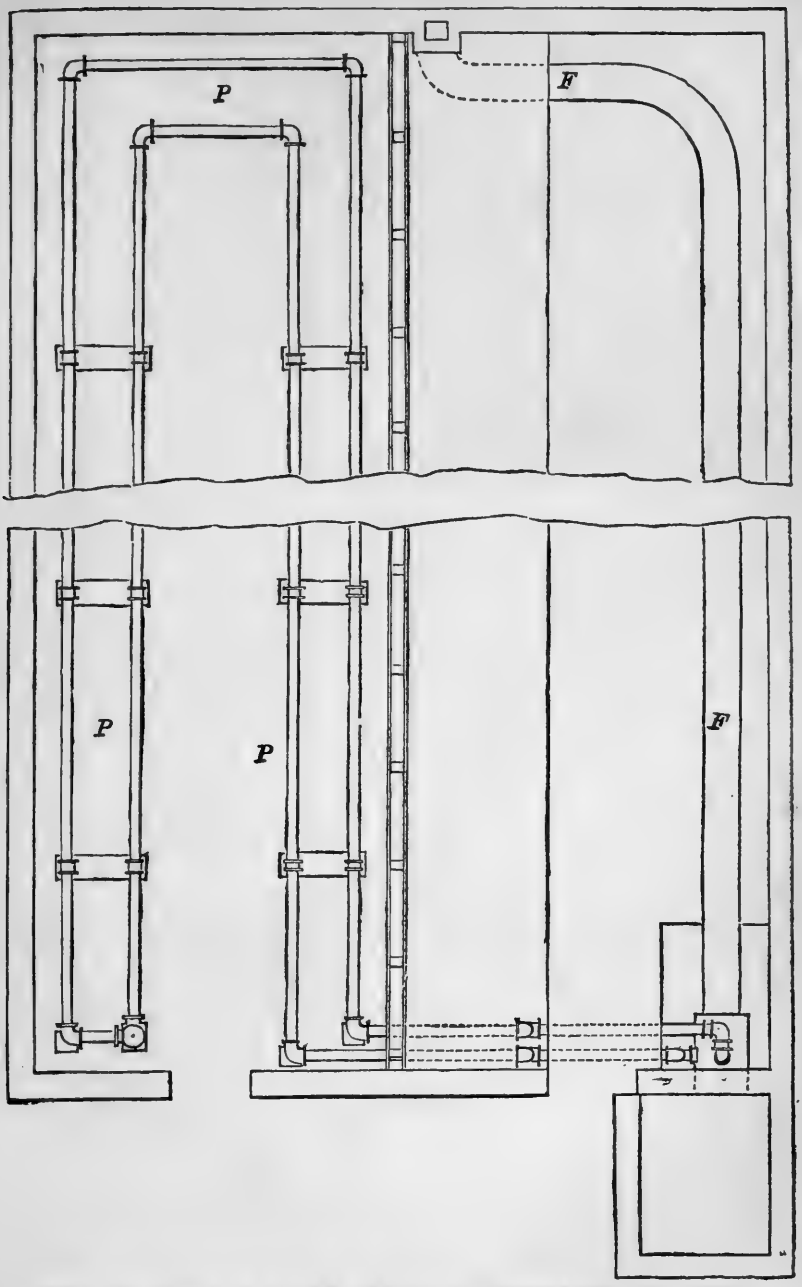


Fig. 14.—PLAN OF HOUSE HEATED BY BOTH FLUE AND PIPES.

been erected on this plan in all parts of the country, and I have been amply repaid by receiving scores of letters of acknowledgment from those who have adopted it, and whose attention was first called to the plan by some of the papers written by me on the subject four years ago.

Another plan in use is shown by figure 14, combining the flue and boiler, from the same furnace. This is the most economical plan in which hot water can be used. As shown in the engraving, there are two houses joined together, each 11 feet wide by 70 feet in length. For

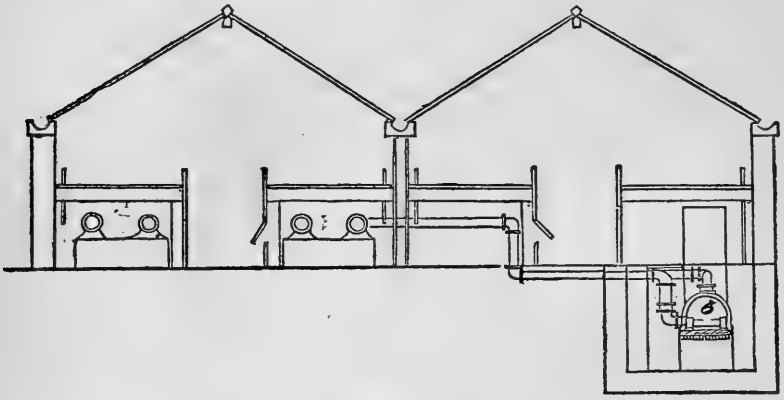


Fig. 15.—END VIEW OF FIGURE 14.

colder sections of the country than the vicinity of New York, from 50 to 60 feet in length would probably be sufficient, but much depends on exposure, and the manner in which the building is constructed. One of the houses is heated by the flue, *F;* the other by the pipes, *P.* The boiler, *b*, shown in the end view of the same house, figure 15, is what is termed a "saddle" boiler, which answers at the same time the double purpose of an arch for the furnace and a boiler. The fire in this furnace does nearly the same amount of heating as two such fires, if used in heating by flues only. Thus, by this combination of flue and pipes, the construction of the heating arrangements costs about 50 per cent less than if the house were heated entirely by hot water. The probable cost of two

houses of this kind, each 70x11 feet, so heated, and otherwise complete, would be about $1200. In erecting all houses on the ridge and furrow plan, the site should, whenever practicable, be such as will admit of extension by future erections, to meet the increase of business. A good plan in beginning is to erect three houses, as shown in fig. 13,

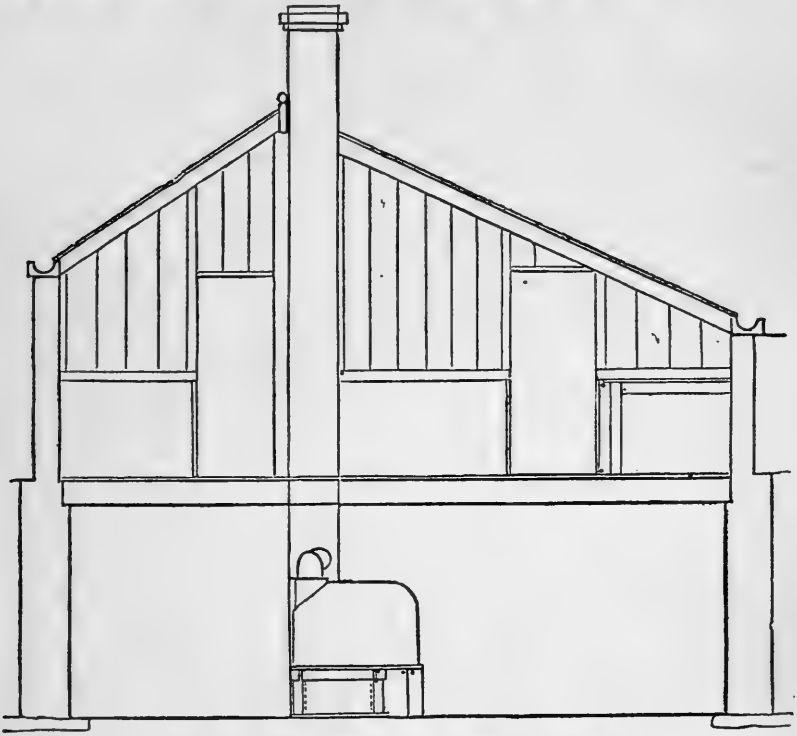


Fig. 16.—END VIEW OF FORCING HOUSE.

page 57, 50 feet in length, so situated, that as business increases, and with more means in hand, the south ends can be taken out, the walls extended 25 or 50 feet further, the flues thrown out, and the heating done by hot water. For, whenever it can be afforded, the heating by hot water will be found to be much the best; not that there is any particular saving in fuel over heating by flues, for in this matter there is but little to choose, but it is more durable, entirely free from danger from fire, or the escaping of

gases, so troublesome with flues; besides, it is an immense saving of labor, more particularly if the green-houses are extensive. In our establishment, covering over an acre with glass, but nine boilers are used, involving the work of only nine fires. If we heated by flues, not less than forty fires would be necessary, and at least three times more labor would be required.

Fig. 16 is the end view and fig. 17 the ground plan of a Hot-house, or Forcing House, erected by us last season, mainly for the purpose of forcing flowers in winter. This house has given us the highest satisfaction, and for the purpose of a conservatory for winter blooming plants, we believe it will be found to be most suitable. So satisfied were we of the practicability of this style of house for this purpose, that we erected it of mammoth proportions, 300 feet in length by 20 wide inside. It will be understood by the sketch, that the roof is stationary, the whole slope fronting south, 15 feet in length, being one unbroken sheet of glass. The back slope to the north, 8 feet in length, is also fixed, but in that there are movable sashes 3 feet square every 9 feet, for the purpose of ventilation, or about one-sixth of the whole roof facing north. The movable sashes are hinged at the top, and are lifted by an iron bar fixed to the lower edge, in which holes are punched every 4 inches, so that the ventilation may be graduated to suit the weather. This amount of space for ventilation on the roof would be entirely inadequate alone, and it is one of the most common errors in building fixed roof green-houses or graperies, to have insufficient means for the escape of the excessive heat generated by the sun's rays in May or June.

But this difficulty is easily and cheaply overcome by admitting air from sliding shutters made in the front wall. The size and width apart of these must depend upon the dimensions of the green-house. In the house above referred to, we have them made 18x24 inches, placed in the

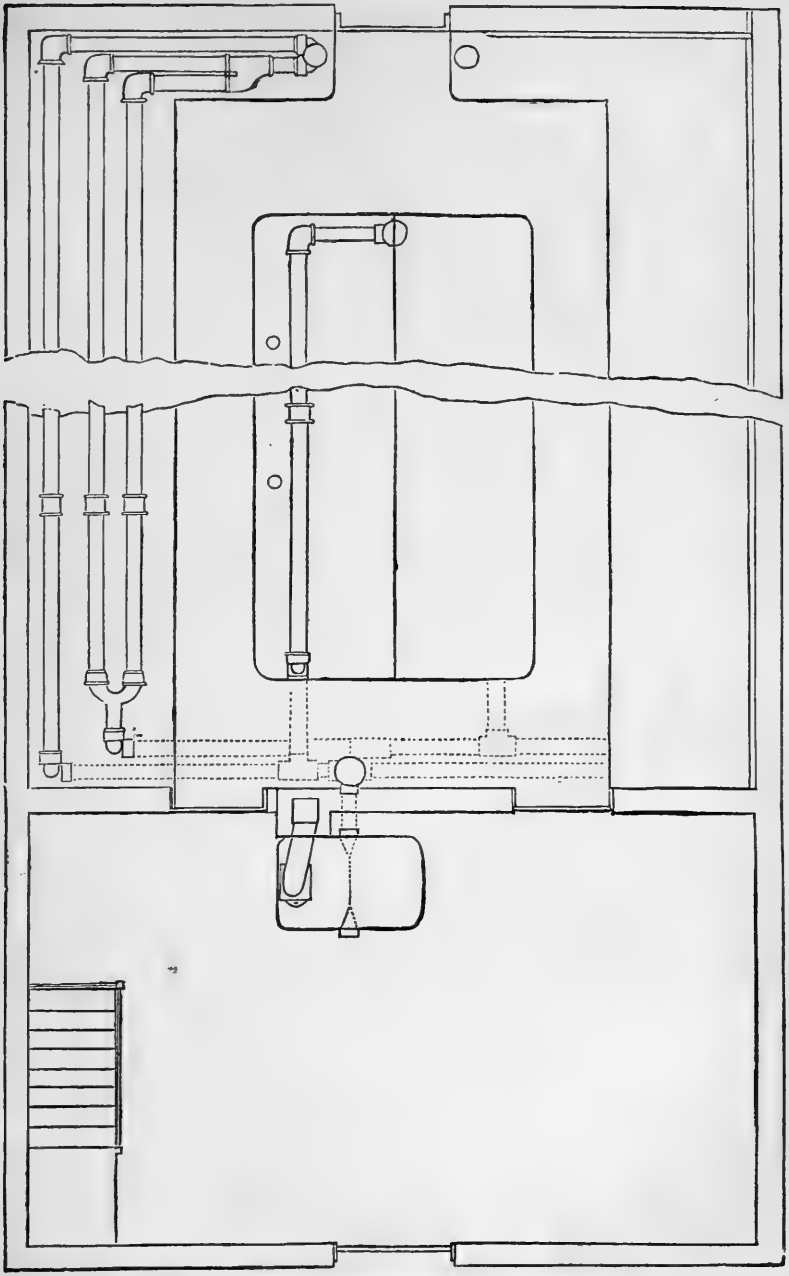


Fig. 17.—GROUND PLAN OF FORCING HOUSE.

front wall 9 feet apart. The proper position of these sliding shutters is of importance. It has long been a common practice to ventilate by front sashes, both in graperies and plant houses which opened *directly* on the plants. The consequence is, that in cold days, while the sun is shining, the house gets heated up, but the lower sashes cannot be opened, for the outside air is often so cold that it would be likely to chill or freeze the plants. But by placing the sliding ventilators on the front or south wall, at such a height that they will be *below* the front bench, but above the flue or pipes, the air thus admitted to cool down the house is modified in its passage across the pipes or flue, so that the temperature of the house is lowered without chilling the plants.

The sliding ventilators run upon rollers, and by attaching a continuous rod to each, 25 or 30 of them can be moved from one end by a slight pull, thus obviating the necessity of getting under the benches to open each one separately. The front or south wall of the building referred to is built of brick-work 8 inches thick. But the back or north wall is built hollow, 10 inches thick; that is, of two bricks placed flat, with an air space of 2 inches, "tied in" by headers of cast-iron, like that shown in figure 18, placed at intervals of 2 feet apart, both in the height and in the length of the wall. A 10-inch hollow wall built in this way costs about the same as a 12-inch solid wall, but is greatly better in all respects. The air space, of course, acting as a non-conductor, keeps the house much warmer than a solid wall would; and besides, a wall like this is much more durable for such a purpose. The experience of most of us who have built solid 8-inch brick walls for green-houses is, that on the north or west side they stand

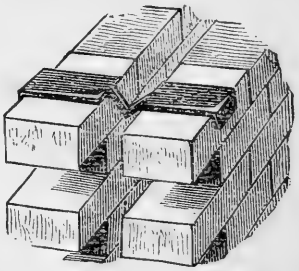


Fig. 18.—HOLLOW BRICK WALL.

badly, owing to the freezing and thawing caused by the great difference between the temperature of the green-house and that of the open air in winter. The difficulty experienced in this way has forced us to the conclusion that it is better to construct the walls of posts and boards, lining with brick inside, rather than to use the ordinary solid 8-inch brick wall; but the best wall for a north or western exposure, when the expense can be afforded, is unquestionably the 10-inch hollow wall.

Figure 19 will show the inside arrangement of the benches, each being exactly 4 feet in width, with a 2-foot space for walks. It will be observed that the back walk is

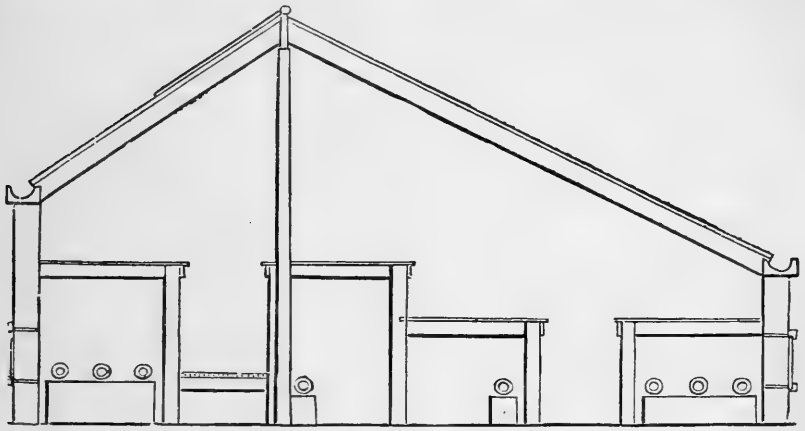


Fig. 19.—INTERIOR OF FORCING HOUSE.

elevated, so that the plants on the benches can be conveniently reached, to arrange plants, water, etc. If for private use, or for visitors, the walks should be widened at least 6 inches. The water is supplied by tanks under the middle bench, 8 feet wide by 4 deep, and half as long as the house. These are arranged in sections, and at convenient distances are placed two of West's Force Pumps, Fig. 11, to which a length of 125 feet of $1\frac{1}{2}$-inch hose is attached. One man or two boys work the pump, while another hand regulates the water over the plants by the sprinkler, so that the plants contained in this building,

measuring about 7,000 square feet of glass, are copiously drenched with water in one hour. If watered in the usual way by watering-pots, the same number of hands would not do the work as well in six hours.

Of all labor-saving apparatuses yet introduced into our gardens, this force pump is the most valued.

As a green-house of this description is built for the purpose of growing winter flowers, ample provision is made for heating; eight 4-inch pipes run its entire length, which is about one square foot of heating surface to three square feet of glass, or, in other words, one foot of 4-inch pipe to three square feet of glass. This is the necessary quantity when a night temperature of 60 degrees is required in sections where the thermometer runs down to 10° or 15° below zero. When a temperature of 40° or 45° only is necessary at night, one foot of heating surface to four feet of glass is the rule. But, of course, much depends on exposure, style of green-house, etc., so that no infallible rule can be applied.

CHAPTER XI.

GREEN-HOUSES ATTACHED TO DWELLINGS.

Every now and then the inquiry is made: "How can I best attach a green-house to my dwelling?" Nothing is more simple, as far as the mere shell of the green-house is concerned, but the difficulty is to heat it. Many may not know that a green-house, even without any artificial means of heating, can be made very useful in the early spring months in this latitude, and in those Southern States where the thermometer does not fall lower than 20° or 25°. It may be used all through the winter.

In the diagram of an end section of a simple house, figure 20, the sashes (*B* and *C*) are 3 feet wide by 6 long; the top one is so placed that it can be let down over the lower one by weights and pulleys, and thus secure ventilation. The front wall and ends are best built by using 4 × 6-inch locust or cedar posts. Upon the outside of the posts rough planking is nailed; against that a

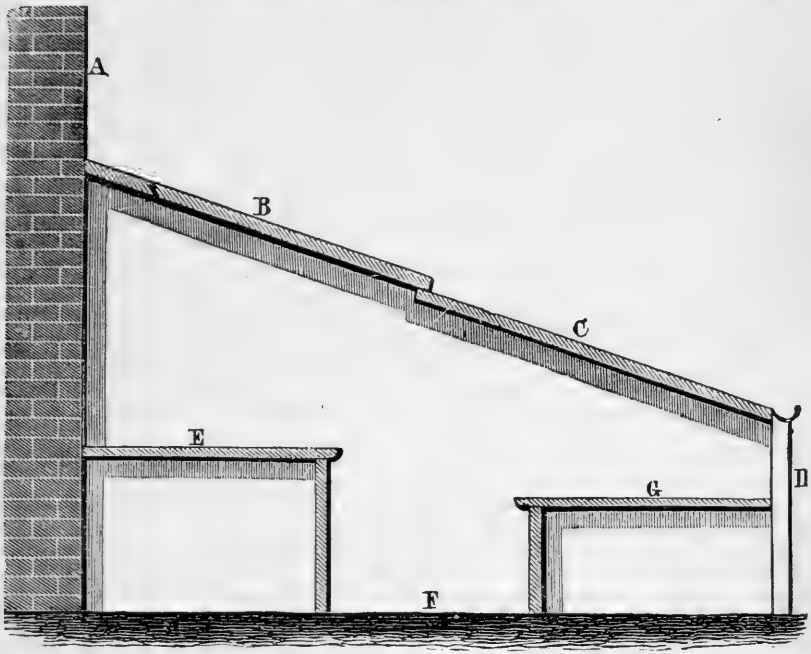


Fig. 20.—SECTION OF A CHEAP GREENHOUSE.

layer of tarred paper; and against the tarred paper the weather boarding is nailed, either overlapping or tongued and grooved, as may be desired. The outer walls of all green-houses built of wood are now thus made with us, and it is found to be far preferable to the old and objectionable mode of filling in between the boards with sawdust or shavings.

The tarred paper is a good non-conductor, and we find walls so constructed are equally as good a protection against frost as a nine-inch brick wall, which would cost

twice as much. A green-house of this kind, 25 feet long by 11 wide, should not cost more than $100 complete, if plainly built; that is, without heating. Heating is a difficult matter in green-houses so attached to dwellings, unless in cases where there is a surplus heat at night from furnaces or stoves in the rooms adjoining. In such cases, the windows or doors, if low enough, could be opened, and enough heat be supplied from the rooms of the dwelling; or, better yet, if it were so arranged that a register from the furnace opened into the floor of the green-house. But when this supply of artificial heat can not be obtained, the green-house as it is will be sufficient to protect plants against any frost that is likely to occur in this latitude after April 1st, particularly if light wooden shutters are put over the lower tier of sashes. I have recommended this style of green-house to many dealers and retail florists in the different States. Those who are simply dealers in plants experience great difficulty and loss in keeping what they purchase for sale in stores or dwelling-rooms; for if not sold at once, they quickly get injured. But this cheap and simple style of green-house not only by its appearance advertises their business as dealers in flowers, but it enables them to buy from the wholesale florists at an earlier season. Besides this, they can purchase in March and April at less than half what the same plants would cost in May, and it gives them time to repot into larger pots. Placing them in the green-house where they have sufficient space to grow, the plants that are bought for $12 per 100 in March, with but little trouble in potting, airing, and watering, will freely retail for 50 cents each in May. These green-houses are also economical and useful to the amateur who purchases for his flower-garden in spring. Bedding-plants, as they are called, can not be safely planted out in the Northern States until the middle of May, and if the amateur buys from the florist then, he generally pays quite double the

price that he could purchase the same plants for in March or April, for the florist always wants room in his green-houses, and can better afford to sell a dozen Geraniums in March for $1.50 than for $3 in May. Besides, the plants if purchased in March, and shifted into larger pots, and allowed plenty of room to grow, would be far better than could be purchased at any price from the over-crowded tables of the florists in May. The care of such plants in the green-house is very simple. The board benches or tables *E* and *G* should be covered with two inches of sand, upon which to stand the pots; place them so far apart that the leaves will not touch; water *thoroughly* whenever the surface of the soil in the pot appears dry, which will be every day in hot weather. Ventilate by letting down the sashes, more or less, as the day is warm or cold, whenever the thermometer indicates 75° or 80°; in other words, keep the temperature in the day-time as near as may be to 60° or 65°, as marked by a thermometer placed in the green-house where the sun will not strike it. Burn half a pound of *damp* tobacco stems on the floor of the green-house twice a week, to destroy the aphis. One dealer in Maine informed me that from a green-house so constructed, 30 feet long by 11 feet wide, placed against the south side of a high board fence, he sold last spring, in six weeks, sufficient bedding-plants that he had purchased, and vegetable plants that he had raised from seed, to afford him a profit of $200, or nearly double the cost of his green-house.

These green-houses can also be used for all the purposes of a hot-bed, thus: Soil placed to the thickness of four inches on the benches will grow fine plants of all varieties of vegetables if the proper time in sowing the different kinds is attended to—presuming that the green-house has no artificial heat other than that produced by the sun's rays which pass through the glass. In this latitude, cabbage, cauliflower, and lettuce had better be sown about

the 15th of March. By attention to ventilating and watering, fine plants may be had in five or six weeks from time of sowing, which will bring them just into the proper season for planting in open ground. Tomatoes, pepper, and egg-plant, and the tenderer kinds of flower seeds, should not be sown much sooner than the end of April. True, they would not be as early as if sown a month sooner in a hot-bed, and *replanted* into the green-house bench in May. But if no hot-bed is at hand, the protection of the green-house over these tender plants in May will give satisfactory results if earliness is not particularly wanted.

I have so many inquiries about the heating and general construction of cheap green-houses that I am compelled to give instructions which are known now to nearly every one in and around our large cities. Yet, simple though the matter may be to us who see so much of it, it is evidently perplexing enough, when they come to construct, for those who have nothing to copy from. Those of us who write on such subjects too often take for granted that those for whom we write know something about the matter, when for the most part they really know nothing.

The cheapest kind of construction is the lean-to just described, that is, where there is anything to lean it against, such as the gable of house or barn. But if the green-house has to be constructed entirely new, I think the span-roof is best—see end-section fig. 13, p. 57. The walls are four feet high, formed of locust or cedar posts, and made with tarred paper between the boarding and weather-boarding as described on page 67. This makes really a better wall for green-house purposes than an 8-inch one of brick, as we find that the extremes of temperature of the green-house—inside at 50°, and perhaps 10° below zero outside—very soon destroy an 8-inch *solid* brick wall, particularly if exposed to the north or west. A wall of wood constructed as above will last for twenty years, and be as good a protection as one of 8-inch brick. So much for

the construction of the frame. The roof is formed by the ordinary sashes, six feet in length by three feet in width, which can be bought ready made, or easily be made by a carpenter or any one handy with tools.

Such a house, if cheapness is an object, should be heated with a flue. It should not be more than 60 and not less than 30 feet in length; if more, the flue would not heat it enough, and if less it would be likely to get too much heat. About 50 feet by 11 is we think the best size of a green-house to heat with a flue. The flue should run all around the house—that is, it should start along under one bench, cross the end, and return under the other bench to the end where it begins, making the length of flue in a green-house of 50 feet about 110 feet long. It should have a "rise" in this length from the furnace to the chimney of at least 18 inches, to secure a free draft. For the first 25 feet of flue nearest the furnace it should be of brick, with an air-space inside of about 7 by 7 inches. From this point cement drain-pipe, 7 or 8 inches diameter, may be used. The drain-pipe is now almost exclusively employed here wherever flues are used; it is both cheaper and radiates more rapidly than brick. The cost of such a green-house, complete, in this section, is about $6 per running foot—that is, one 50 feet long by 11 feet wide costs about $300 complete. [See Chapter XLV, page 266.]

CHAPTER XII.

MODES OF HEATING.

Although I have alluded to the different modes of heating elsewhere, the matter is one of so much importance, that I will again refer to it more directly.

Where but one building is erected, with not more than 1,000 square feet of glass surface, or where the beginner is limited in means and must practice economy, a smoke-flue

may be used to a very good purpose. Any mason will be able to build a smoke flue, by having the following instructions. Let the bars of the grate be from 20 to 30 inches in length, making a width of grate from 10 to 15 inches, according to the size of the house to be heated; say the smallest size for a surface of glass of 300 feet, the latter for 600. Where the furnace pit can be drained, if there is danger of water standing in winter, it is always best to place the furnace so deep that the furnace bars will be say 3 feet from the top of the flue where it first starts along the house; at all events, the bars should never be less than one foot below the bottom of the flue. After setting the grate bars in the usual way, by resting them on an iron plate let into the brick-work at front and back, the sides of the furnace should be built with fire brick and fire clay, (if at all procurable), to the height of 10 or 15 inches, according to size. From that point an arch is turned over to cover the furnace, the "neck" of the furnace rising at a sharp angle for about 2 feet, until it runs into the flue. The flue should be raised from the ground by means of bricks, either one upon edge or two laid flatwise. This costs perhaps one-third more in building, but it exposes a greater heating surface, besides keeping the flue always dry, and permitting it to "draw" better at all times. The cheapest and simplest form of flue is made as follows: After the bottom is formed, the flue is built up by placing two bricks on edge, the top being covered by a brick laid flat. This may be varied, however, for larger houses, by placing 3 bricks on edge and covering by tiles. The larger the furnace, of course the greater the necessity for a larger flue. A flue had better never exceed 120 feet in length, and this length should be secured by running the flue along one side of the house, crossing the end, and returning along the other side to the place of beginning, where it connects with the chimney. If the flue can have a gradual rise of 1½ or 2 feet in its entire length, so much the better. Whenever it is made

to return, a greater amount of heat will be got from the same quantity of coal, than if it merely ran straight along one side, and turned round the end to connect with the chimney.

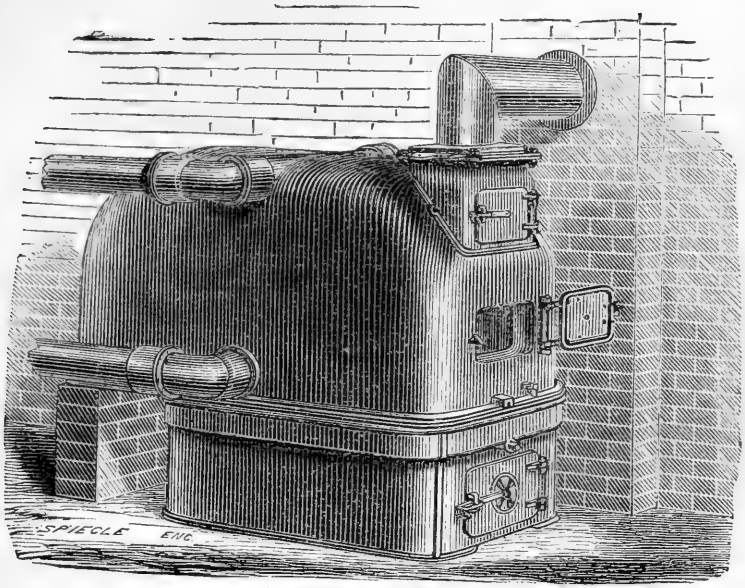
Too great caution cannot be used in keeping woodwork away from the flue and chimney, at the furnace end; and for 15 feet of the hot end of the flue, wood should never be placed nearer than one foot. Do not listen to what your builders may say, as few of them have had experience in such matters, and whatever they may pretend, not one in a dozen knows any thing more about what is dangerous from fire than you do yourself. On one occasion I had in use two houses heated with flues each about 100 feet in length. The chimneys had been made of wood, and they had been safely used for three winters, but on the occasion of a severe storm in winter, when our fires were going at full blast, both of them took fire within an hour of each other, though fully 100 feet from the furnace. Fortunately the chimneys had been attached to the *outside* of the house, and were knocked off without material injury being done. On another occasion, a house containing upwards of 10,000 plants took fire by a workman placing kindling wood on the flue near the furnace. The result was great injury to the green-house, and total destruction of its contents. I mention these cases, to show the necessity of the utmost caution. Every winter there are hundreds of fires originating in green-houses by the woodwork taking fire from flues.

In this particular, if in no other, the heating of green-houses by hot water has an immense advantage over flues, for with this there is danger neither from fire, smoke, nor the gases that often escape from badly built flues. Still, in some particulars I do not believe in the advantages claimed for hot water heating by its advocates. I have never yet seen a boiler able to heat a given surface of glass

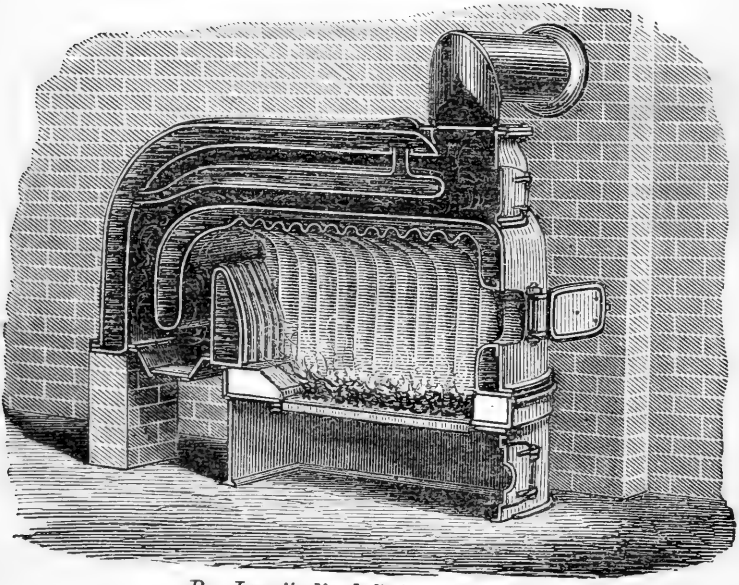
with less fuel than would be used by flues. Nor is the heat given out by iron pipes, filled with heated water, any less dry than that given out by a flue which has been heated to the *same temperature* as the water. The advantage in favor of the water is, however, that its temperature is nearly the same at one end of a house as at the other, while with the flue the furnace end may be heated to a temperature of 300°, but where it enters the chimney, it may not be more than 100°; hence at the furnace end we get a *dry* heat, simply for the reason that our heating medium (the bricks) is unavoidably heated to too high a temperature, and to counteract the *dryness* occasioned thereby, pans of water should be placed upon the flue while firing hard.

The saddle boiler is the simplest form of boiler, and may be used in connection with a flue, as shown in figure 15, on page 60.

The great point to be aimed at in the construction of a boiler, is to get the greatest amount of *heating surface*, directly exposed to and near to a given grate surface. Scores of boilers are in use, all claimed by their respective makers to be nearest to this condition, yet many of them are comparatively worthless, as our experience has rather expensively taught us, as we have thrown out two of them as useless, at great trouble and expense. Without desiring to show a preference to any particular maker, we can only say that an investigation of the subject has led us to use, as the most effective, one of recent introduction, known as "Hitching's Corrugated," figure 21. We have now ten of them in use, which together heat 15,000 feet of 4-inch pipe, and heat a glass surface of 35,000 square feet, to 30 degrees in the coldest weather. It will be seen by the engraving that the portion exposed to the fire is ribbed or corrugated, so as to expose a larger surface than if plain. This part of the boiler differs but little from the ordinary saddle boiler, but, as the figure shows, the heat passes around and over the boiler to a smoke pipe in



A.—Elevation of Boiler.



B.—Longitudinal Section of Boiler.

Fig. 21.—HITCHINGS & CO.'S PATENT BOILER.

front. This heat, after it leaves the direct action of the fire, when passing again to the front of the boiler, is called "secondary," and though its power is comparatively slight compared with the direct heat from the fuel to the inner surface, yet it otherwise indirectly benefits, by checking the rapid escape of heat out at the chimney, which would be the case to a great extent if this back draft was not used. We believe that by using this second heating surface, a saving of one-third in fuel is made. At present prices, a boiler and pipes to heat 1,000 square feet of glass by hot water will cost in this district about $500. Brick flues, to heat the same area, would cost about $100.

Heating by tanks of hot water was much in use a few years ago, when the grape vine fever was at its height, and is still used by some for propagating purposes; but our experience, as well as that of many others who have had them in extensive use, is that they are an unprofitable means of heating. Made in the usual way, of wood, we have never known them to be in use over two winters without seriously leaking. If made by lining with zinc, or by having them made of cast-iron, they then cost as much as the regular 4-inch pipe, and are not so durable, and for the heating for any purpose they have no advantage in any respect over them; four years ago I threw out over 2,000 square feet of wooden tanking, that had leaked so as to become unserviceable in three years, and replaced it by 4-inch pipe. Almost all who have used them have had the same experience.

CHAPTER XIII.

BASE-BURNING WATER-HEATER.

For many years a great want has been felt for a better means of heating green-houses, or rather conservatories, attached to dwellings. The space to be heated is usually

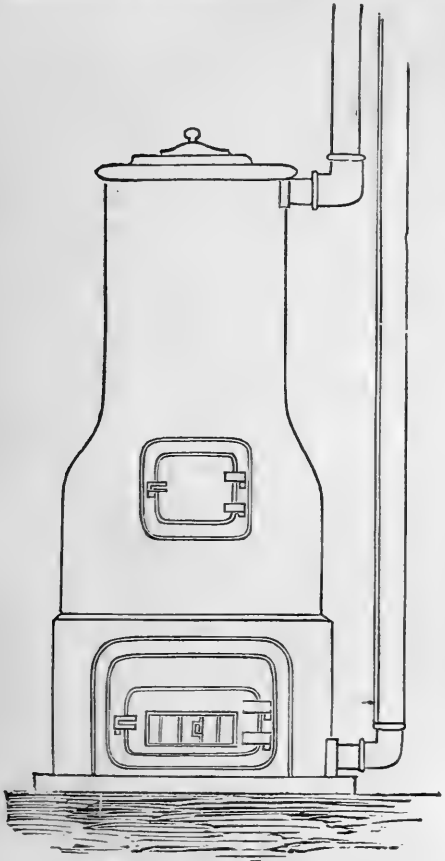


Fig. 22.—BASE-BURNER.

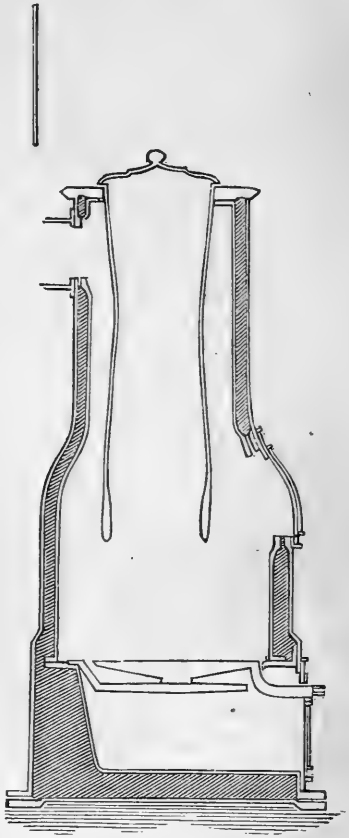


Fig. 23.—SECTION.

so small, that the ordinary hot-water boilers in use for large operations have been found by amateurs too complicated, and to require too much attention. Then when the common smoke-flue was tried corresponding difficulties

arose, it requiring nearly the same attention as the more expensive boiler. Occasionally these conservatories are heated by registers from the furnace heater, just as the ordinary rooms of the dwelling; but I have rarely seen any so heated wherein the plants looked well, it being difficult to get the register so placed as to diffuse the heat

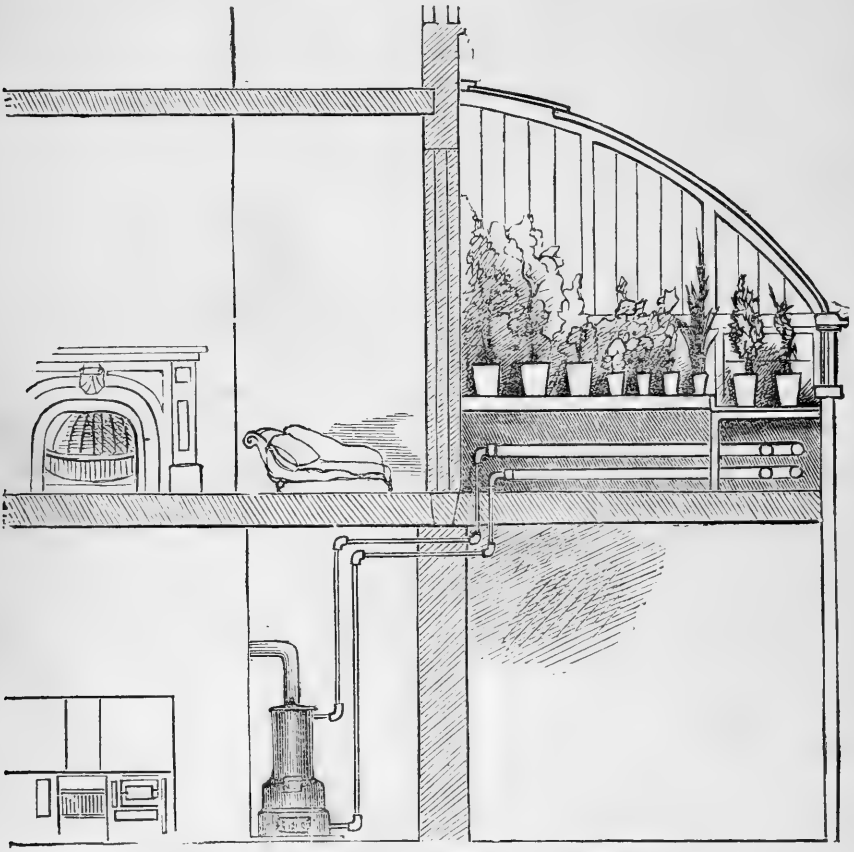


Fig. 24.—SECTION OF HOUSE AND CONSERVATORY.

evenly. A new base-burning water-heater has been invented by Hitchings & Co., the well known green-house-heating firm. There is nothing new in the principle, nothing to patent, I believe. It is simply making the ordinary base-burning stove heat water so that it will circulate in iron pipes and warm a small green-house or

conservatory attached to a dwelling or otherwise, exactly as our larger boilers do, which are not usually made on the base-burning principle. The patterns they have thus far made (shown in figure 22 and in section in figure 23) are 42 inches high and 21 inches at base, and are powerful enough to heat a green-house 10 feet wide by 20 feet long, or about 400 square feet of glass surface, taking into account the front and ends. The complete cost of heating, including boiler, pipes, and fitting up, will range from $150 to $200. The care necessary in the management of this base-burning water-heater is exactly the same as that required for an ordinary base-burning stove, and it may be safely left twelve hours without attention, keeping a temperature in the house of from 50° to 60° at night, which is about what is required for a general collection of plants. Figure 24 shows the boiler placed alongside the kitchen range, being in a basement and one story lower than the conservatory. It can either be used in this way, or placed in the conservatory itself if so desired. It must be borne in mind though, in constructing a conservatory, that it must be placed where a chimney can be used, as of course an outlet must be had for smoke exactly as in any ordinary room where a stove of any kind is used.

CHAPTER XIV.

PROPAGATION OF PLANTS BY SEEDS.

The propagation of plants of all kinds by seeds is a matter in which instructions can be given only to a certain extent. Long experience only can give the necessary knowledge for the full understanding of the proper tem-

perature and humidity essential for the successful germination of the different varieties. It may be laid down as a safe rule, however, that for the hardier varieties, a low or medium temperature is required, say from 45° to 60°, and for the tender species, a temperature from 75° to 90°.

If Pansy seed is sown in July or August, where the temperature in the shade averages 80°, no matter how moist the soil is kept, if germination takes place at all it will be of so feeble a kind that the seedlings will not continue a healthy existence; but if the same seed were sown in September or October, with an average temperature of say 60° in the shade, a quick and healthy germination would be the result. The same rule applies to Cinerarias, Calceolarias, Auriculas, Primulas, and all other plants of this half-hardy nature. English, Scotch, and Irish gardeners, before they have had time for experience in this country, are apt to fall into the common error of sowing all these seeds too soon. Though it is proper to sow these seeds in July and August in England, with us, in this section, it must be delayed to September or October, and in warm latitudes still later, or failure is almost certain to follow. On the other hand, if we attempt to germinate Portulacas, Balsams, Amaranths, Zinnias, or other plants of tropical origin, in the medium temperature of 50°, they will either remain dormant until a higher temperature occurs, or perish. Ignorance of, or inattention to, these conditions, is far oftener the cause of failure than want of vitality in seeds.

Whether seeds are sown in the open border, in the window garden of the parlor, in the hot-bed, or greenhouse, the same conditions should be observed, as far as practicable. In the open border there is not always a choice of soil, but if soil is to be prepared, let it be of a light nature; leaf-mould from the woods, and well-pulverized muck from the swamps, are excellent to sift on

as a covering; or, where it is obtainable, the mould formed by decayed refuse hops is of great value as a covering for seeds. We have employed this exclusively as a covering for seeds of all kinds for many years, with results which have been vastly superior to those we had when we did not use it.

It must be borne in mind, that at first seeds do not so much need a fertile soil as they do one having the necessary mechanical condition; this is found exactly in the light, moisture-retaining nature of hop-mould. We can give no better rule than the old one of covering seeds to about their own depth with mould, although something depends on the *weight* of the material with which they are covered. One-fourth of an inch in depth of hop-mould or leaf-mould would be no more than equivalent to half that depth of ordinary loam; hence the advantage in using it, as it gives the seed a moist, springy covering, through which the tiny germ can freely push.

We know it is a practice very common with amateurs, and many gardeners, when starting seeds in hot-bed or green-house, to use flower-pots in this operation; they are generally two-thirds filled with potsherds, overlaying which is an inch or two of soil, and on this the seed is sown. Any continuation of dry weather necessitates almost daily watering of the flower-pots; this bakes or hardens the surface, while a day's inattention to them dries the soil, while it is in this condition, so as to injure the vitality of the seeds; hence very unsatisfactory results too often follow this practice.

For many years we have entirely discarded the use of earthen flower-pots or pans for the purpose of sowing seeds, and use shallow boxes instead. These we prepare by cutting the common-sized soap-box in three pieces, each one of a depth of about two inches. These boxes are filled with the prepared soil to the depth of $1^{1}|_{2}$ inch, which is gently and evenly pressed, so as to give an en-

tirely level surface; the seeds are then sown, and a light covering, from $^1|_{16}$ to $^1|_4$ part of an inch thick, according to size or strength of seed, is sifted over them, through a sieve having a mesh only $^1|_{12}$ part of an inch in diameter. The covering is gently pressed, to prevent the air penetrating the loose soil and drying up the seeds; watering, which it is well to avoid as much as possible, is thus rendered less necessary. Be careful, however, not to let them suffer for moisture, as in the weak condition of seedlings most plants are quickly injured by neglect of this kind, and, even with all possible care, we experience serious losses. Many varieties will "damp off," as we term it, just as the first rough leaves are being formed; this, however, is not the result of excessive moisture, as it occurs just as quickly in a dry temperature as a moist one. It is evidently caused by the same insidious spider-web-like substance that is known among gardeners as the "fungus of the cutting bench," and is evidently one of the minute fungi of which we have so many representatives. The best preventive of this disease, as it is sometimes called, is, just as soon as the seedling plants can be handled, to take them from the seed-boxes, and prick them out in boxes of similar mould, from $^1|_2$ to 2 inches apart, according to the variety. This is a much better method than potting them off in flower-pots, as it not only saves time and room, but they always do better. In the flower-pots they are liable to be dried up, and the tender roots of the seedling plant quickly destroyed.

We use these shallow boxes largely for pricking off cuttings from our propagating benches, instead of potting them off, particularly such plants as are wanted for stock to be planted out in the open ground, as, after being rooted in the cutting-bench, and planted out in these shallow boxes, they can there remain, occupying less space, and in every respect growing as well as if in pots. Carnations and Roses we work largely in this way.

CHAPTER XV.

WHAT VARIETIES COME TRUE FROM SEED?

An intelligent correspondent asks the question given above. He queries still farther, and says: "An apple-seed produces an apple-tree, but a Baldwin apple-seed will not produce a Baldwin apple-tree. Wheat of any variety produces the same; seed of a scarlet variety of Verbena will not always produce its like. Why this anomaly?" The "why" of the matter can not be told, but a few general rules may be useful. Seeds of plants in the wild state, in their native habitats, almost invariably produce a progeny nearly identical with the parent; and many species, even after they have been subjected to long years of cultivation, never appear to change seemingly in the slightest degree. Other species under cultivation quickly develop varieties entirely different from the original, and become what is technically termed "broken." Thus the original species of our well-known Verbena is indigenous to South America, having a comparatively small scarlet flower. From this, and probably some other species hybridized with it, we have the gorgeous and varied coloring of the variety of to-day. But it took many years to produce these, for we can well remember in our early gardening days there was no white, and the furor that took place in the floricultural world when *Verbena teucrioides*, the first white, appeared. It was far from being an attractive plant, but the color was novel, and single plants were sold by the florists of that time at a price that would now buy a hundred. The Verbena, then, is one genus whose species have given us innumerable varieties. The Chrysanthemum, Dahlia, Fuchsia, Geranium, Pansy, Petunia, the Rose, and many others, are also familiar examples where the original species has

"broken" from what may be termed its primary condition into everchanging variety. Thus changed, it is probable that their seeds will never produce two individual plants exactly alike, any more than two identical human faces or forms are produced. It is probable that all species of animals and vegetables, under long years of domestication and cultivation, would ultimately "break" from the original type, though we know that in some species this tendency sooner develops than in others. It is not to be wondered at that amateur horticulturists, like my friend, are puzzled at what looks like inconsistency in nature—why she refuses to produce always again his Baldwin apple, or his Rareripe peach, his Striped Petunia, or his Double Carnation, yet gives him back seemingly identical with the parent his corn or his wheat, his tomato or his cabbage, or in flowers his Mignonette or Alyssum. I say seemingly, for it may be doubted if they are identical, only that the variation is so slightly marked that it escapes notice. Many whose experience in such matters should have taught them better, are always confounding plants raised from cuttings or slips with those raised from seeds, and can not see why the plant raised from the slip or root of a White Dahlia, or the tree raised from the graft of a Baldwin apple, should be always identical with the plant or tree from which they are taken, while the *seeds* taken from either would not produce the same. Any cutting from a root or a branch, whether rooted itself or engrafted on another stock (except in rare cases of sports), will be identical with that of the original form from which it was taken; in fact, it is only a *separated part of the same plant*, while the plant raised from seed is a distinct individual.

Very few not engaged in the cultivation of flowers as a business, know that many of the most beautiful ones used to decorate flower-beds in summer, and the hot-house or parlor in winter, can be raised from seed. The price of

seeds, as compared with plants, is very low; a package of seed costing twenty-five cents will usually raise as many plants as could be bought from the florists for $25. It is true that care and labor are necessary in starting them, but the pleasure derived from the operation alone, well repays that, independently of economic considerations. April is the best month for sowing most of the seeds of tropical plants, and it is best done, where there is the convenience, in a hot-bed. The hot-bed is made in the usual manner. The soil used should be, if possible, of a light, sandy nature, mixed with at least one-third of leaf-mould from the woods; if the leaf-mould is not procurable, pulverized muck, or stable manure rotted to the condition of mould, will do nearly as well. This is spread over the manure of the depth of about six inches. The sashes of the hot-bed should fit close, and there should be some material ready for covering the sash at night; either straw-mats or shutters. We, ourselves, use shutters made out of $^{1}|_{2}$-inch stuff, and exactly the size of the sash. All these preparations being made, insert a thermometer in the soil covering the hot-bed, and when it indicates a *declining* temperature of 75°, the seeds may be sown. Most of the flower-seeds may be sown in a hot-bed just as we sow egg-plants or tomatoes, which is best done for private use by sowing in rows from a quarter of an inch to an inch in depth, according to the size of the seed, the distance between the rows being two or three inches. Let me here repeat a caution that I have often given in connection with seed-sowing: Be sure that the soil used for covering the seed is light; nothing is better than leaf-mould, but if it can not be got, use the other substitutes before named. One half of the loss in seeds is in consequence of their being covered with a heavy, clayey soil. The vital force of different plants in this respect is widely different. Thus, while the seeds of tomato will germinate in almost any soil, the egg-plant—

a vegetable of the same class—requires the utmost care. As soon as the seeds have grown so as to attain the first true leaves—that is, the first leaves that show after the seed-leaves—they must be replanted carefully in soft, light soil, at from one to three inches apart, according to the kind. This will not only prevent them from damping off, as many of them are very apt to do, but they will be much stronger and suffer less when replanted to the open ground. We prefer to replant the seedlings in the shallow boxes already described. They are more portable thus than if planted again in the soil of the hot-bed, though, of course, after planting in the boxes these are put again in the hot-bed. After the seedlings have been planted in these boxes lightly water them and shade for two or three days. As the season advances, attend to ventilation, watering, and covering up at night.

To such as have not the convenience of a hot-bed, the flower-seeds may be sown in the shallow boxes above mentioned, and placed in the window of a south or east room, where the thermometer does not average less than 70°. Success would be more complete, however, if panes of glass were placed over the seeds, resting on the edge of the box an inch or so from the soil. This would prevent evaporation, and render watering, which has the effect of caking the surface of the soil and preventing germination, less necessary.

We will name the varieties of flowers most suitable for amateurs to sow:

Canna Indica, or Indian Shot, grown mainly for the beauty of its foliage. Sown in hot-bed in April, and planted out in the open ground in June, will, by August, attain a height of six or eight feet. In addition to the rich, tropical-looking foliage, the flowers of some sorts are handsome—colors yellow, scarlet, orange, etc.

Antirrhinum, or Snap-Dragon.—A beautiful summer

flowering plant, presenting a great diversity of coloring, is easily raised from seed in the hot-bed. The Antirrhinums may be planted out in this latitude in May, and flower from middle of June throughout the summer.

Cobæa Scandens.—A climbing plant, which will attain, from seed, a growth of twenty or thirty feet in one season. The flowers are bell-shaped; purple; 3 inches in length by 1½-inch in breadth. The seeds are thin and flat, and should be placed on edge when sown.

Coleus.—This famous ornamental-leaved plant is easily raised from seed, and breaks into endless varieties. It is exceedingly tender, however, and had better not be sown before May, nor planted out before June.

Zonal Geraniums are, perhaps, the most valuable of all plants for summer-blooming in our climate. They are easily raised from seed, and will well reward the amateur by the endless variety produced. A few years ago the only colors of these were scarlet and pink. Now we have them of every shade, from white to crimson, with endless tints of scarlet and rose. The Zonal Geraniums may be lifted and potted in the fall, and if well pruned in when lifted will bloom finely in winter.

Lantana is another plant easily raised from seed; the flower resembles somewhat the Verbena, but has, besides many of the colors found in the Verbena, orange and yellow, which are not found in that flower.

Lobelias.—Dwarf plants, well suited for hanging-baskets, or for ribbon-lining. The flowers range from white to blue. The blue of the Lobelia is often of the richest azure, unsurpassed by that of any other plant.

Pansy, or Heart's-ease.—The usual mode with the florists is to sow the seeds of Pansy in the fall, so that the plants may be large enough to be in bloom when he sells in May. In this condition it will flower, perhaps only to the middle of June, for by thus being prematurely forced

into flower it becomes exhausted and stops blooming, and often dies outright; but when sown in February or March, in green-house or hot-bed, the growth is unchecked, and it will grow and flower from June to November.

Petunias, being of rapid growth, will flower the first season, even if sown in the open ground, but usually not before July or August. If sown in the hot-bed in April, they will bloom in June and make larger and finer plants.

Dianthus.—The Pinks are numerous and varied, many of them having a rich, clove fragrance. They present an endless variety in color and style of flower.

Salvia Splendens, or Scarlet Sage.—Seeds of this sown in April will flower by July or August, and continue throughout the season. This, perhaps, is the most gorgeous plant of our gardens; single plants often attain a height of six feet, and nearly as much in diameter, having a hundred scarlet, plume-like flower-spikes. The color is so intense when seen against a green background, that it is often visible at the distance of half a mile.

Verbenas.—The most popular plant of the day is easily raised from seed, and no other plant that we know of will so well reward the trouble. The number of varieties now attained is something wonderful, even to us in the trade. Every year develops some new strain. Every color seemingly is obtained but *yellow or orange;* these we never expect to have, as there seems to be a natural law of the floral kingdom that blue, yellow, and scarlet are never found in varieties of the same species. Thus we have in Dahlias and Roses yellow and scarlet colors but no blue, just as we have in Verbenas blue and scarlet but no yellow. My readers will do well to remember this, and be saved, as they occasionally are, from investing in "blue" Roses or Dahlias, and "yellow" Verbenas, and know that the seller must either be ignorant of his trade or dishonest.

Double Zinnias.—These, like Petunias or Balsams, can be raised to flower by August if sown in the open ground, but if sown under glass in April will flower in June and throughout the entire season, making larger and finer plants. There are few plants that have improved so much as the Zinnia, and we have now dazzling, scarlets, yellow, orange, lilac, rose, white, and crimson rivaling the Dahlia in symmetry of form.

CHAPTER XVI.

PROPAGATION OF PLANTS BY CUTTINGS.

Of all the operations of the florist, the one above all others in importance is the propagation of plants by cuttings. It is the fount from which the supply must come, and becomes inexhaustible in the hands of a careful operator. I say a careful operator, rather than a skillful one, for, in my estimation, a great amount of knowledge is not so necessary to success as that a never-flagging, careful application of that knowledge should be made. A *careful* man, who has had the run of a propagating establishment for one year, and who has kept his eyes and ears open, will have acquired a theoretical and practical knowledge of the business sufficient to enable him to operate with success, provided he is of fair intelligence and studious habits. On the other hand, we find hundreds who have spent the best part of their lives in the trade, whose careless character renders useless the knowledge possessed, when this branch of horticulture is placed in their charge.

I have long held the opinion that the necessary knowledge to successfully propagate plants by cuttings is very

simple, and may easily be imparted by writing, even to one having no acquaintance whatever with the operation. I will first state the system practised by commercial florists, following with that suited for amateurs or private gardeners.

When the operations are such as require a house set apart exclusively for propagating, the best style, in our opinion, is that shown by the diagram on page 55.

We have used this style for the past three years, and, thus far, cannot see how it can be further improved upon; it works perfectly, and if the simple conditions which we lay down for our guidance are strictly followed, failure is an impossibility. It will be seen by the diagram that the heating is done by hot water pipes, two of which (4 inches in diameter) run under each bench; but it must not be supposed that it is indispensable that the heating of a propagating house should be done with hot water, to insure success. The common smoke-flue, run under the bench in the same position as shown for the pipes, will give bottom heat, if carefully regulated, just as well as the hot water pipes; only in all cases where the first cost is not an object, we advise heating by hot water in preference to flues. The bottom of the bench is best formed of slate or thin flagging-stone, as they are better conductors of heat than wood. When it is not convenient to obtain these, common rough boarding will answer. The scale applied to the diagram will give the measurements.

We are in the habit of placing 3 or 4 inches of well-rotted refuse hops, tan bark, or some such material, well beaten down, over the boarding or flagging; over this we place about 2 inches of sand. Our reason for using the first-named materials, passing the heat through them before it reaches the sand in which the cuttings are placed is, that it becomes modified and approaches to the moist and genial heat of the hot-bed. This practice is by no

means indispensable to adopt, as sand alone, placed on the boards or flagging, to the depth of 3 inches, will answer the purpose very well; but when the materials can be procured conveniently, we believe it to be preferable. Some gardeners give preference to particular colors or textures of sand, but I think that these have little or nothing to do with the rooting of cuttings. In our experiments, we have tried sands of all colors and of nearly all textures, together with charcoal-dust, brick-dust, cocoa-nut fibre, rotted refuse hops, and many other materials; cuttings root in all in nearly the same time and with the same success, satisfying us, beyond all doubt, that the material in which the cutting is placed acts merely as a medium to hold the moisture. We use sand because it is a clean and convenient material to work with, and is generally easily attainable. In my earlier experience, I was a victim to the popular notion that it was necessary to use silver sand in the propagation of particular plants, and was for years at much trouble and expense to obtain it. But this even did not save us; we were in those days working at hap-hazard, failing quite as often as succeeding, until further experience taught us what were the causes of failure and the conditions of success.

With exceptions so few, and those of so little importance that it is hardly worth while to allude to them, cuttings of all kinds root freely from slips taken from the young wood—that is, the succulent or unripened growth that a plant has made. The proper condition of the slip at the time that it is inserted in the sand of the cutting-bench is of great importance,—a condition which it is astonishing to believe is so little understood among gardeners. Somehow the idea has become current that every cutting must be made by cutting just below a joint or just at one. The practice of this system leads undoubtedly to many cases of failure; not that the mere cutting at or below a joint either assists or hinders the forma-

tion of roots, but from the fact that when a slip is cut at a joint the shoot has often become too hard at that point, while half an inch higher up, or *above* the joint, the proper condition would be found. The safest rule for the novice to adopt in propagating all kinds of

Fig. 25.—PROPER AND IMPROPER CONDITIONS OF CUTTING.

soft-wooded plants is to bend the cutting on the shoot; if it breaks or snaps, as in the upper part of figure 25, it is in the right condition, but if it can be bent without snapping, as shown in the lower part of the same figure, it is then too hard. We know it will root even in this hard condition, but it will root more slowly, and the roots emitted will be hard and slender, and, as a consequence, will not be likely to produce a plant of the same vigor as

that made from one in the proper state. In propagating woody plants, such as Roses, Azaleas, Daphnes, etc., this test of breaking or snapping does not apply, although all these will root, if taken in the same way; yet we find it enfeebles their growth more than if the cutting is allowed to get harder. What this degree of hardness is, it is difficult to describe; in Roses it assumes the proper degree of hardness when the shoot develops the flower-bud. But, although we do not take Rose cuttings in the same succulent condition as we would a Fuchsia or a Verbena, it must not be imagined that it is necessary to make the cutting at a joint. The doing away with this custom in propagating Roses enables us to increase the product of a plant at least twice as much as if we practised under this dogma, for the cutting will root just as well, and become quite as good a plant, if made with a single eye, (figure 26,) as if cut at a joint having two or three eyes, (figure 27). Although we have said that cuttings can be as easily rooted without being cut at a joint as otherwise, yet there are, in some plants, other considerations that necessitate that they should never be cut except at a joint; for example, a Dahlia cutting will root quite as freely, make as fine a flowering plant in fall, and the tuberous root increase to its full size; but it will not be able to start again in spring, because the Dahlia pushes only from the crown of the root, and if the crown has not been formed from a cutting cut close

Fig. 26.—ROSE WITH SINGLE EYE.

below a joint, as in figure 28, it is worthless, as the tubers and crown formed without an eye possess no latent or dormant buds; hence the importance of always making Dahlia cuttings by cutting immediately below an eye, *if the roots are wanted for future use.*

In cases where it is desired to make the most of new plants, we sometimes split the cuttings, as shown in figure 29. This method, however, is not generally desirable, and we question if, except in cases of Calceolarias, and a few other plants of like character, it is ever worthy of practice.

Fig. 27.—ROSE WITH SEVERAL EYES.

If a plant is perpetuated by cuttings with difficulty, we usually find it is freely increased in some other way; thus the Cyclamen, Myrsiphyllum, some varieties of Clerodendron, etc., are slow to increase by division or cuttings, but are abundantly multiplied by seeds. Again, the Bouvardias, Anemone Japonica, Pyrus Japonica, Calycanthus, etc., are slowly increased by cuttings or shoots, while by cuttings of the roots they are propagated with the greatest ease and rapidity.

The roots of such plants are thickly studded with latent, or, as they are termed, *adventitious* buds. These are cut into pieces of half an inch or so in length, as in figure 30, strewn thickly on the propagating bench, and covered over with an eighth of an inch of sand, mixed with some

light material, such as finely sifted rotten refuse hops or leaf mould. These are treated exactly in the way of cuttings of the shoots, except that there is no necessity ever to shade root cuttings; water should be sparingly given until they have freely started through their covering. One of the most important plants to propagate by root cuttings is the Bouvardia, and it requires to be placed in a high temperature. It is better not to put the roots in to start before the season is sufficiently advanced to keep the temperature steadily high, say about the 15th of March, or 1st of April. The Bouvardia is also increased by cuttings of the young shoots, but it requires more care, the plants so made are not so fine, and the ease and certainty with which they make good plants by cutting up the roots render any other mode useless.

Fig. 28.—DAHLIA CUTTING.

I have said that if the simple conditions that we lay down for our guidance in the propagation of plants are strictly followed, failure is an impossibility. These conditions, together with the state of the cutting, are *temperature and moisture.* It is very easy to give a rule for these, yet it requires unremitting attention to keep to that rule through all the deviations of the seasons, and it is hardly possible to follow it, whenever the outside temperature exceeds the limit given. Hence we find that the propa-

gation of most plants in this section of the country is attended with great difficulty, and with but little success in the months of June, July and August, and for this reason some of the best European propagators fail, when attempting the operation here in July, with the thermometer in the shade at 90°, while in London success may attend these efforts at the same date; but then the thermometer there only marks 70°. This twenty degrees just makes the difference. I have dwelt thus long on the subject of temperature, to fix in the mind of the reader what I believe to be of great importance, and to prepare him to understand, if failure occurs, where to place the cause, for without much doubt every case of failure is traceable either to the unsuitable condition of the cutting, irregularity of moisture, or temperature.

Fig. 29.—SPLIT CUTTING.

The most proper condition of temperature, to root cuttings of the great majority of green-house and bedding plants, is 65 degrees of bottom heat, indicated by a thermometer plunged in the sand of the bench, and an atmospheric temperature of 15 degrees less. A range of 10 degrees may be allowed, that is, 5° lower, or 5° higher, but

the nearer the heat of the sand can be kept to 65°, and that of the rest of the house to 50°, the more perfect the success will be.

From the time the cuttings are inserted in the sand until they are rooted, they should never be allowed to get dry; in fact, our practice is to keep the sand soaked with water, the cutting bench being watered copiously every morning, and often, when the atmosphere is dry, again in the evening. Kept thus saturated, there is less chance of the cutting getting wilted, either by heat from the sun's rays, or from fire heat; for be it remembered that if a cutting once gets wilted, its juices are expended, and it becomes in the condition of a hard cutting, in the condition in which, when bent, it will not snap nor break, which we have shown to be the proper state at figure 25. To avoid this wilting or flagging of the cutting, every means that will suggest itself to the propagator is to be used. Our practice is to shade and *give air* in the propagating house just as soon in the forenoon as the action of the sun's rays on the glass raises the temperature of the house to 65° or 70°. This practice of giving air in a propagating house is, I am aware, not in very common use; many contending that the house should at all times be kept close. We have tried both methods long enough and extensively enough to satisfy us beyond all question, that ventilating

Fig. 30.—ROOT CUTTING.

and propagating at a low temperature is capable of producing a larger quantity of stock during the season than at a high temperature and in a close atmosphere. There need be no failures, and it has the important advantage of producing a *healthy* stock, which the close or high temperature system would fail to do in the case of many plants. We have often heard propagators vauntingly tell of taking out two crops of cuttings in 10 days. We are well aware that this may be done, but we are also aware that it is often done in damp and cloudy weather at the risk of the whole crop, and it must be done at a high temperature, which, at all times, causes the plants to draw up slender, and thus impairs their vigor.

I am of the opinion that permitting a moderate circulation of air in the propagating house tends to prevent the germination of that peculiar spider-web-like substance, which, for want of a better term, is known among gardeners as the "fungus of the cutting bench." Every one who has had any experience in propagating knows the baneful effects of this; how that, in one night, it will often sweep off thousands of cuttings that a few hours before were in healthful vigor. But this insidious enemy of the propagator requires, like vegetation of higher grades, conditions suitable to its development, which evidently are a calm atmosphere and a temperature above 55 or 60 degrees. Hence, to avoid this pest, we make every effort by shading, airing, and regulation of fire heat, to keep the atmosphere of the house so that it shall not exceed 60°. This, of course, is not practicable when the outside temperature in the shade is above 60°, but the temperature can be reduced considerably by dashing water on the pathways and other parts of the house. It is rarely, however, that the outside temperature ever exceeds 60 degrees for any length of time in this district before the middle of May, and all propagating should be finished previous to that time, unless of tropical plants, or plants

that will stand and require a hot-house temperature in their growth, such as Poinsettias, Bouvardias, Coleus, Clerodendrons, etc. These propagate more freely in a temperature 20 degrees higher than that laid down for general guidance.

The *shading* of the glass, to prevent the temperature from rising in the house, is done in various ways, some using canvas, or bast-matting, or painting the glass with lime or whitewash. We find the cheapest and most convenient shading to be that formed by screens made of common lath nailed an inch apart to a frame the size of the sash, (3x6). This gives an ever-varying, modified shade, sufficiently cooling to the house, yet not darkening the cutting enough to impair its vigor. These are not put on in the morning until the temperature inside indicates it to be necessary, and are taken off in the afternoon as soon as the sun ceases to shine on the glass, for it is of the utmost importance that the cuttings receive as much light as they will bear without becoming wilted. Cuttings rooted in too much shade, and at a high temperature, are drawn up spindling, and take months to recover from the injury done by this injudicious treatment. The time required by cuttings to root varies from 5 to 20 days, according to the variety, condition of the cutting, and temperature. Verbenas, Fuchsias, or Heliotropes, put in in proper condition, and kept without ever being allowed to wilt, will root in an average bottom heat of 65°, in 8 days, while Roses, Pelargoniums, or Petunias, will take at least double that time under the same conditions.

Another point of importance, and one too often neglected, is to pot off the cuttings at once when rooted, no matter how small the roots may be; half an inch is a much better length for them to be when potted than two inches, and the operation is much more quickly performed when the roots are short than when long. But the main evils of delaying the potting off of cuttings are, that when

left too long the cuttings grow up weak for want of room, the roots, which become hard and woody, do not strike freely into the soil, greater care is required in shading and watering after potting, and the plant usually loses its lower leaves, weakening its vitality, and subjecting it to a greater chance of disease. With but few exceptions, cuttings should never be potted into pots exceeding 2½ inches in diameter; the infant plant in its transition state has as yet but limited vitality, and should not be gorged with food. The soil used should be sifted fine, through a sieve with meshes something less than ½ of an inch in diameter; thus fine, it is more congenial to the roots, delicate as yet, and besides, it is more easily and quickly used in the operation of potting. After potting they should be set on a bench covered with an inch or two of sand, and freely watered with a fine rose watering-pot, and for two or three days treated exactly, in shading and watering, as if they were yet in the propagating bed. If at this stage they are allowed to wilt from drying, or excess of heat, feeble and sickly plants will be the result.

The preceding method is that in use in most of the large florists' establishments in the vicinity of New York, and is applicable wherever there are regular propagating and plant houses; but as there are hundreds of amateur florists having, perhaps, only one green-house, and thousands who have no green-house at all, who would gladly know how to increase their plants, to these we can detail a simple method, yet one equally effective and safe. This method has already been described by me in several of our horticultural periodicals, and I can now offer nothing new on the subject. It is called the

"SAUCER SYSTEM" OF PROPAGATING,

because saucers or plates are used to hold the sand in which the cuttings are placed. This sand is put in to the depth of an inch or so, and the cuttings inserted in it close

enough to touch each other; the sand is then watered until it becomes in the condition of mud, and placed on the shelf of the green-house, or in the window-sill of the sitting-room or parlor, fully exposed to the sun, and never shaded. But one condition is essential to success,—until the cuttings become rooted *the sand must be kept continually saturated, and kept in the condition of mud;* if once allowed to dry up, exposed to the sun as they are, the cuttings will quickly wilt, and the whole operation will be defeated. The rules previously laid down for the proper condition of the cuttings are the same in this case, and those for the temperature nearly so; although, by the saucer system, a higher temperature can be maintained without injury, as the cuttings are in reality placed in water and will not droop at the same temperature as if the sand was kept in the regular condition of moisture maintained in the propagating bench. Still the detached slip, until rooted, will not endure a continuation of excessive heat, so that we advise, as we do in the regular method of propagating, that the attempt should not be made to root cuttings in this way, in this latitude, in the months of June, July, or August, unless with plants of a tropical nature. When the cuttings are rooted, they should be potted in small pots, and treated carefully by shading and watering for a few days, as previously directed.

In many of the operations in floriculture as in vegetable gardening, success or failure depends upon their being done at the proper time, and though it may seem like a needless repetition, I can not too strongly enforce upon the novice the importance of observing the dates that the experience of our best cultivators has shown to be best under our peculiar climate. Whoever in this matter follows the directions of an English work upon horticulture will be sure to fall into difficulties, although its teachings may be exactly suited to the English climate. I would here refer to the evils arising from the too common

practice of many of our agricultural and horticultural journals, of selecting from English papers articles that often seriously mislead. For example, a Boston magazine a year or two ago copied a long article from the English *Journal of Horticulture*, telling us in a very patronizing way how to propagate the golden tricolor-leaved geraniums. The writer laid great stress on having a sharp knife and cutting the slip in a particular manner, then to insert it in silver sand, and a lot of other nonsense that any boy of six months' practice here would have known was absurd; but, above all, the operation was to be performed in *July!* He might have got the sharpest knife that was ever made, and the purest silver sand that ever lay on the seashore, but he would have utterly failed in our climate, if he attempted the work in July. This is only one of scores of such absurd selections as we see yearly in some of our horticultural journals. If the conductors of such have not original matter to fill up with, better far that they leave their pages blank than to show their utter ignorance of what is suitable to our climate.

CHAPTER XVII.

HOW PLANTS AND FLOWERS ARE GROWN.

Many of my readers live so remote from our great cities and towns, that "Flower manufacturing," as it may be termed, is something by them unseen and even unheard of. To such the accompanying sketches, taken in the middle of the month of December, from our establishment in Jersey City, N. J., may be interesting as well as instructive.

Figure 31 represents an inside section of a propagating house. This has a propagating bench or table on each side, having a ledge to it, and is covered with about three

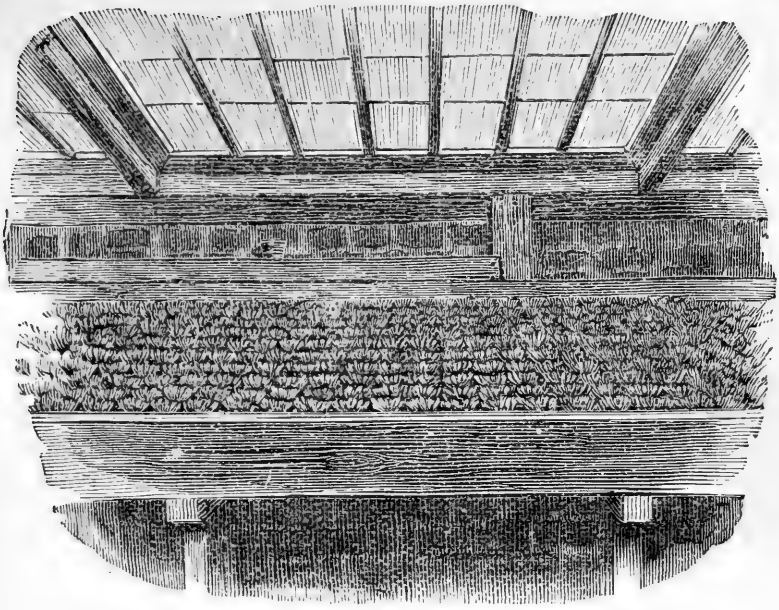


Fig. 31.—FIRST STAGE.—CUTTINGS OF VERBENAS.

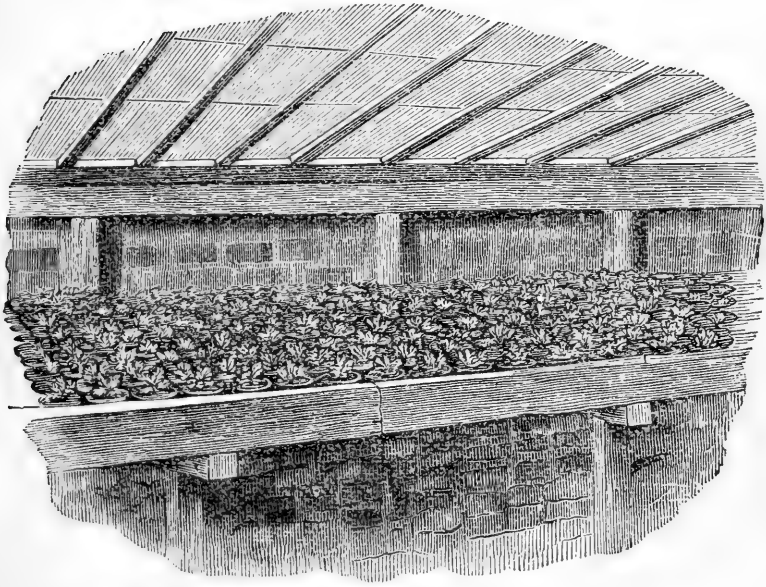


Fig. 32.—SECOND STAGE.—VERBENAS IN POTS.

inches of clean sand. The engraving shows the cuttings as they are inserted in rows in the sand. The space shown is about 9 square feet, in which are set about 1,000 Verbena cuttings. These are taken in the green state from the old plants, cut into lengths of about 2 inches, and inserted about half their length in the sand. They are shaded when the sun is hot, and freely watered every day until they take root, which will be in about 8 days from the time they are planted in the sand. The proper temperature for the sand is 60°, and that of the atmosphere of the green-house should be 10° lower. The sand on the bench in which the cuttings are placed is raised to a higher temperature than the air of the green-house, either by a smoke-flue passing under the bench or by pipes containing hot water. As soon as the cuttings are rooted they are planted in pots $2^{1}|_{2}$ inches in diameter by $2^{1}|_{2}$ in depth, and again freely watered by a fine rose watering-pot.

Figure 32 shows an inside section of a green-house, with the plants in this the second stage of growth. These operations are continued during the season, from November to May. In May the plants are ready to be set out in the open ground. Some conception of the vast numbers grown of this plant—the Verbena—may be formed when we say that 300,000 were sent out from this establishment during the months of March, April, and May of 1873; and when it is known that there are many hundreds, great and small, of florists' establishments in the suburbs of New York, all growing more or less of this popular summer flowering plant, it may be easily conceived that many millions are planted annually. We can well note the increase of taste in the culture of flowers from this single plant alone. Twenty years ago, when we grew 5,000 Verbenas one year, we thought we would overstock the market; but we did not, and the vast increase that has been steadily made tends to no such result. And it must

not be forgotten that this is only one species of flower among many hundreds grown. Next in numbers to the Verbena comes the Rose; of these perhaps half the number is sold, but as the plant is more valuable, a far larger amount in money is realized. Twenty years ago, 50,000 roses would have supplied all the demand for New York market; it must now require millions.

Figure 33 shows another phase of green-house culture—the growing of plants to produce cut flowers in winter.

Fig. 33.—POINSETTIA PULCHERRIMA.

This section shows a mass *Poinsettia pulcherrima*, as planted in one of the green-houses. Each of these tropical-looking growths is about one foot in diameter, and of the brightest scarlet that it is possible to conceive; these are not, however, exactly flowers, but are bracts or outer leaves of the flower. They are in perfection just at the holidays, and conduce more than any other flower to give the tables of our hospitable New Yorkers on New Year's Day a look of gorgeous elegance. In our green-

houses a space of 3,000 square feet is devoted to this plant, and in bright sunshine is presently a blaze of scarlet that is perfectly dazzling.

Figure 34 is a section of a Rose House, where the Tea Roses are being forced for their buds in winter. A space of 6,000 square feet of glass is devoted to this department, producing about a thousand buds daily. The varieties grown are very few, as we find only six or eight

Fig. 34.—ROSES IN POTS.

sorts are suitable for forcing. We name the kinds in order of excellence as we find them—Safrano, Isabella Sprunt, Bon Silene, Duchess de Brabant, Agrippina, Le Phœnix. These embrace saffron, yellow, straw, pink, carmine, crimson, and rose colors. To force Roses in winter, the plants must be grown in pots during the previous summer and fall. It is useless to lift a Rose plant from the ground in the fall and expect it to flower well during winter.

Figure 35 represents a section of the house in which is

grown the *Double White Chinese Primrose.* This is the most prolific of all winter-flowering plants. The

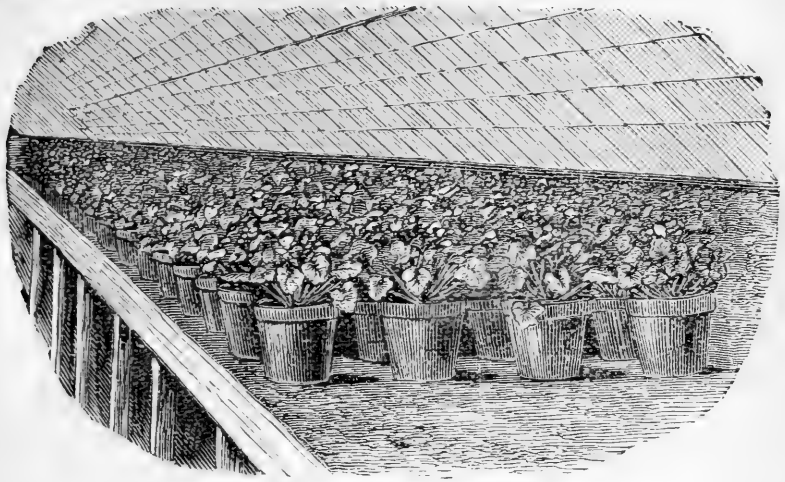


Fig. 35.—DOUBLE PRIMROSES.

green-house in which we grow these has about 1,000 square feet of surface. Each plant occupies about a

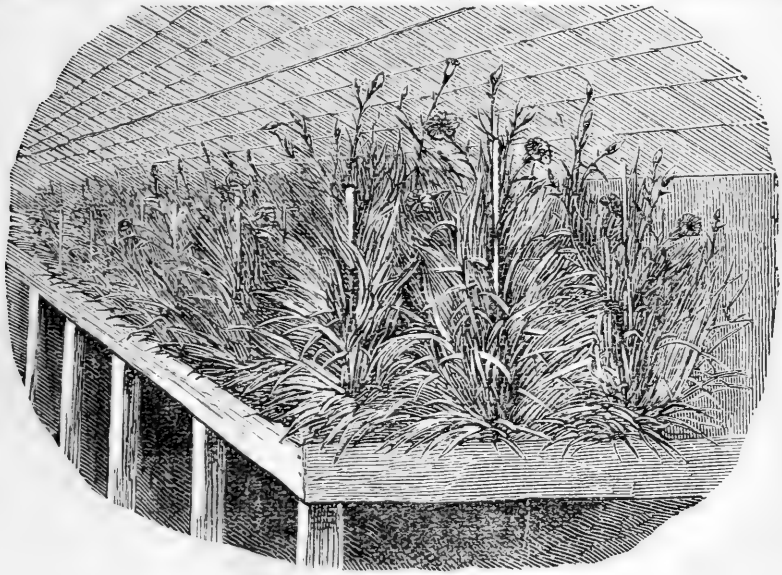


Fig. 36.—CARNATIONS.

square foot of space and produces not less than 500 flowers on each plant. In fact the whole green-house is

one continued sheet of snowy whiteness from November to May. It is perhaps the most profitable of all winter flowering plants grown by the florist.

Figure 36 is a section of Carnations (or Pinks, as they are sometimes called) growing, planted out on one of the green-house benches. Of late years this has become one of our most popular winter flowers, and perhaps more space is devoted to it than to any other flower. Its cultivation is easy and simple, and for that reason it is less profitable here perhaps than anything else grown. The cuttings are treated exactly as the Verbenas, already described. As the plant is quite hardy, it is planted out from the green-houses early in spring, (at the season we plant cabbages), in the open ground, at about one foot each way. The flowers are not allowed to develop during the summer, but the buds are cut off as they appear —the flowering resources being husbanded for winter. In October they are lifted and planted on the benches. Many of these plants produce over a hundred flowers. The sorts grown are very few, mainly carmine and pure white. The Carnation, however, comprises many hundred varieties; but we find comparatively few flower sufficiently freely in winter to warrant their growth; though for private collections a score of sorts might be grown to represent the different colors and markings.

CHAPTER XVIII.

PROPAGATION OF LILIES.

The increasing interest taken in the Japan and other Lilies renders their rapid increase a matter of much interest, not only to the commercial florist, but to the amateur cultivator, who may wish to increase his stock of some

rare or valuable variety, and finds the ordinary mode too slow. In most species they do not increase by division, the usual method, more than at the rate of doubling annually. There are two rapid modes of propagation, both simple enough to be practised by any one, even without the aid of green-house or frames, although in the mode to which we will first allude, the aid of glass will save some time in the operation. On examination of the bulb of any of the lilies, it will be seen to be made up of a number of scales, varying in number from twenty to nearly a hundred, according to the size of the bulb; from five to twenty of these may be broken off from the outer circle of scales without injury to the bulb. Now at the base of each scale is a latent bud, which under certain conditions develops itself as a small bulb. The conditions are simply to press the scale down upright in some light, sandy compost, so that its upper part is level with, or a little below the surface of the compost; give it then a slight watering, and in from one to two months bulblets will be formed, as shown in figure 37. The best way is to use shallow boxes for the purpose, and begin the operation about the first of February. Keep the boxes in a temperature of from 50° to 60°, either in the green-house or dwelling-house, for there is no occasion for direct light, and the bulblets will be formed so that the boxes may be set out in the open garden in May. It is best to plunge the boxes in the soil, undisturbed, level with the surface, so that they will have greater uniformity of moisture. Treated thus, the scales will make bulbs of the size of crocus by fall. It is better not to disturb the bulbs in the fall, but merely cover the boxes, on the approach of severe weather, with three or four inches of rough litter or leaves, allowing

Fig. 37.—SCALE OF LILY.

them to remain thus covered until spring. In spring, if too thick, they may be planted separately, and by fall of the second year will make flowering bulbs.

There is another method of increasing the Lily, which is simpler and equally expeditious. On lifting up in the fall an old plant that has bloomed, it will be observed that the large bulbs are formed *below* the roots that are thrown out from the stem at the surface of the ground; after detaching this mass of roots from the bulb, an examination will show that, imbedded among the roots of every plant, there are from six to twelve small bulbs, about the size of hazel-nuts, as in figure 38, in which fewer bulbs are shown than are usually produced. Allow these to remain attached to the roots, and plant the whole closely packed together in rows or beds, as desirable, covering up on the approach of winter, as directed for the scales. In spring, on removing the covering, the young bulbs will be starting up with great vigor, some of them being of sufficient strength to flower the first season, and by fall making bulbs, nearly all of which will be of sufficient size to flower. This method of increasing the Lily is practised by our cultivators, but I am of the opinion that it cannot

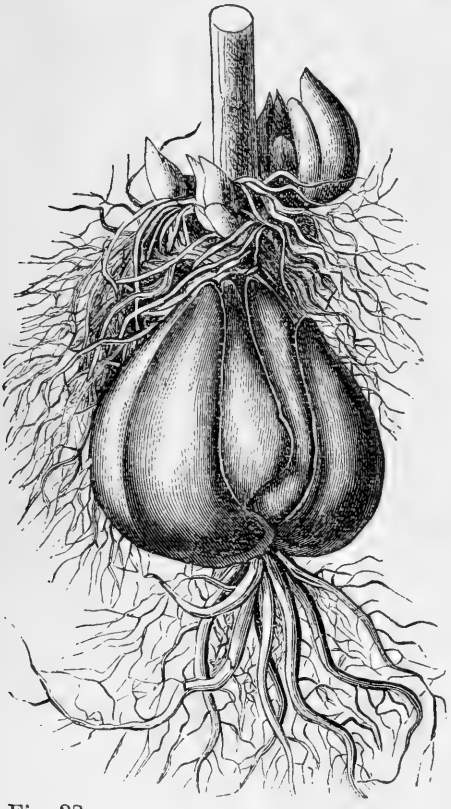


Fig. 38.—LILY BULB WITH BULBLETS.

be in use in Europe, else there would be no necessity of keeping the bulbs of the Japan Lilies at the rates they have been held for the past ten years, as by this method they can be as profitably grown as Tuberoses, Hyacinths, or Tulips, and sold at the same rates.

The subjoined is a list of Lilies in the collection of an amateur, P. Hanson, Esq., Brooklyn, L. I., who has, perhaps, the largest collection possessed by any one in the United States. The names of only the most striking varieties are given, although the collection numbers over 150 sorts, if the sub-varieties are included.

Lilium auratum.
" splendidum.
" Brownii.
" bulbiferum.
" " hativum.
" Buschianum.
" Camschatcense.
" " Sarana.
" Canadense.
" rubrum.
" candidum.
" " punctatum.
" " speciosum.
" " spicatum.
" Catesbæi.
" Carniolicum.
" Chalcedonicum.
" colchicum (Szowitzianum).
" concolor.
" cordifolium.
" Coridion.
" corruscans.
" croceum.
" auratiacum major.
" " minor.
" eximium verum.
" formosum. *Versch.*
" fulgens atrosanguineum.
" " incomparable.
" giganteum.
" lancifolium album.
" " Melpomene.

Lilium lancifolium nanum.
" " punctatum.
" " roseum.
" " rubrum.
" longiflorum.
" " foliis variegatis.
" " Lin-kin.
" Martagon.
" " album.
" " " punctatum.
" " elegans.
" " purpureum.
" " " flore pleno.
" " " striatum.
" " superbum.
" monadelphum.
" Neilgheriense.
" Pennsylvanicum.
" pendulum.
" peregrinum.
" Philadelphicum.
" pomponium.
" pubescens.
" pulchellum.
" pumilum.
" puniceum.
" pyrenaicum.
" sinicum.
" spectabile.
" staminosum.
" superbum.
" " Carolinianum.

Lilium superbum luteum.
" " pyramidale.
" " rubrum.
" " splendidum.
" Sibiricum splendens.
" Thompsonianum.
" Thunbergianum.
" " aureum.
" " pictum.
" " variegatum.
" Loddigesianum.
" latifolium.
" pinifolium.
" sanguineum.
" venustum.
" bicolor.
" umbellatum.
" " citrinum.

Lilium umbellatum cruentum.
" " Groom's Hybrid.
" " Hendersonii.
" " maculatum.
" " Princess of Wales
" " splendidum.
" " Thorburnii.
" tigrinum.
" " angustifolium.
" " erectum.
" " foliis variegatis.
" " fl. pleno.
" " Japonicum.
" " laciniatum.
" " præcox.
" volubile.
" Wallichianum.
" Thunbergianum cupreum.

CHAPTER XV.

CULTURE OF THE ROSE.

In the limited space that can be afforded to Roses in the present work, the account must of necessity be condensed. Those who wish fuller details are referred to works especially devoted to Rose culture. Amongst the writers on the Rose, are Buist, Parsons, and Parkman, practical horticulturists, all of whom have treated the subject in a clear and comprehensive manner. A botanical classification of varieties would be useless for our present purpose, but we will endeavor to make our readers comprehend the leading features of the Garden Classification of the Rose. Roses may be classified under three general heads:

First.—Those that bloom only once in the season, embracing the Hybrid China, Provence, Sweet and Austrian

Briers, most of the Mosses, and all climbing varieties that are hardy in the latitude of New York.

Second.—The Hybrid Perpetuals, or Remontants. This class is of comparatively recent origin, and was obtained by hybridizing the Provence and Damask varieties with the Ever-blooming or China. They possess the rough foliage and spiny stems of the former, with, to some extent, the intermittent blooming qualities of the latter. This is by far the most interesting class of Roses, and embraces many hundred varieties, ranging through all the intermediate shadings from purest white to darkest crimson. They combine the hardy, robust habit of the Provence with its unsurpassed odor, but unfortunately they do not possess the ever-blooming qualities of the China. The term "perpetual," therefore, is a complete misnomer, for unless the flowers are cut off as they develop, and the plant kept growing freely, but little bloom is ever given, except in the regular season of Rose flowering, (here in June), and again to some extent in the fall. They, like the preceding class, are all hardy in the vicinity of New York.

Third.—The Monthly or Ever-blooming class, which is clearly distinguished from both the preceding by its more delicate and shining leaves and stems. It comprises at least four sub-classes, namely, the Noisette, Tea, Bengal, and Bourbon. The Noisettes are all of rampant growth, usually flowering in clusters, and in the Southern States, where they are uninjured by winter, are, perhaps, the most valuable of all Roses; a good type of this class is seen in the Lamarque (white.) The Tea varieties are characterized by slender growth, great delicacy of coloring, and the rich tea fragrance from which the class derives its name. Safrano (orange yellow) may be taken as a type of these. The Bengal class is not quite so numerous or varied in color, but is now so intermixed with the Bourbon and Tea, that it is difficult

to tell where to place many of its varieties; a true type of this class is the well-known Agrippina, (crimson). The Bourbon class is an extensive one, coming nearer to the Hybrid Perpetual in its large and double flowers and more rugged growth, and to the Bengal in the absence of all yellow or orange shade of color in its flowers. An old and unsurpassed type of this class is the well-known Souvenir de la Malmaison, (blush).

All of this class are tender, and unless in situations particularly favored by a dry soil, and well sheltered, are either killed outright, or cut down to the roots by the frosts in winter almost everywhere in the Northern States. Every now and then we hear of new varieties of this class, which are represented to be hardy, but I would say to amateur readers, and to gardeners whose experience in such things has not been sufficient to guide them, that in all such cases the vender either is ignorant of what he says, or knows that his representations are false. There is no more likelihood of our getting a Noisette, Tea, Bengal, or Bourbon Rose to prove generally hardy in latitudes where the thermometer runs down below zero, than there is to have hardy Camellias or Chinese Azaleas. A few years ago, a Western firm had the impudence to get up a stock of the old Noisette Rose, Solfaterre, named it "Augusta," and representing it as a "Yellow Everblooming, hardy" variety, sold some thousands of it at $5 each. They seem to have sold their reputation at the same time, however, for after perpetrating the swindle, they were not afterwards heard of.

It is with hesitation that we give a list of a few varieties of each class, as to name only one out of every score of varieties seems to be unfair and invidious towards those not given, which, perhaps, have claims surpassing those we thus distinguish. But to describe the different colors and characteristics of each class it becomes necessary.

CLASS I.

(Embracing Provence (P.), Hybrid China (H. C.), and Damask (D.)

Name.	*Sub Class.*	*Color.*
Adonis	H. C.	Dove color, shaded crimson.
Alphonse Maille	P.	Reddish crimson, extra fine.
Amarille	P.	Deep blush.
Apifolia	P.	Deep pink, cut leaved.
Baron Cuvier	H. C.	Dark purple, very full.
Berlese	P.	Purple, speckled crimson.
Blanchefleur	H. C.	White, finely cupped form.
Blairii	H. C.	Light pink, strong grower.
Carmin Royal	D.	Bright deep rose.
Carnea	H. C.	Blush.
De Candolle	H. C.	Deep crimson, very fine and full.
Elise Vaiart	D.	Crimson purple.
Fulgens	H. C.	Velvet crimson.
Gen. Foy	H. C.	Crimson, shaded violet.
Gazelle	H. C.	Rose, spotted carmine.
La Negresse	D.	Dark, purplish crimson.
La Superbe	D.	Brilliant carmine.
La Touterelle	H. C.	Lilac, or dove color.
Madam Plantier	H. C.	Pure white, free.
Madam Mortier	H. C.	Dark, velvet crimson.
Ne Plus Ultra	H. C.	Brilliant scarlet crimson.
Prince Caroline	H. C.	Rose, shaded crimson.
Unique	P.	Pure white.
Unique Panachee	P.	White, striped rose.
Village Maid	P.	White, purple striped.
York and Lancaster	P.	Semi-double, striped red and white.
Warratah	D.	Purplish crimson.

Mosses.

Alice Leroy.....Lilac shade of rose.
Blanche.....Clear white, very fragrant.
Celina.....Brilliant crimson, very mossy.
Comtesse de Muvonais.....Blush, strong grower.
Cristata.....Buds crested, color light carmine.
Damask Moss.....Light crimson, very fine.
Etna.....Crimson, fine cupped form.
Laneii.....Deep pink, full double.
Luxembourg.....Crimson, purple shaded.
Perpetual White or 4 Seasons..Blush white, semi-double, fall flowering.
Princesse Adelaide.....Deep rose, strong grower.
Unique de Province.....White, back of petals red before opening.
White Bath.....Pure white, very mossy.

Briers.

Harrisonii.....Pale yellow, semi-double.
Hebe's Lip.....White, tinted carmine.
Maiden's Blush.....Large, blush colored, very fragrant.

Persian Yellow.....Deep golden yellow.
Victoria.....Salmon, centre buff.
Stanwell.....Blush white, strong grower.
William 4th.....White, vigorous grower.
Yellow Cabbage.....Deep yellow, very double.

Climbing Roses.

Baltimore Belle.....Blush white, blooming in large clusters.
Eva Corrine.....Deep blush, very double.
Gem of the Prairies (Burgess').Large, full; carmine, blotched white.
Laura Devoust.....Deep rose, immense truss.
Mrs. Hovey.....French white, large and fine.
Madam D'Arblay.....Creamy white, splendid.
Pallida.....Pale pink, full and vigorous grower.
Ruga.....Blush, exceedingly fragrant.
Russeliana.....Crimson, shading to pink.
Queen of the Prairies.....Deep rose, striped white.
Superba.....Flesh color, clusters immense.
The Garland.....Blush, shading to white.

CLASS II.—Hybrid Perpetual or Remontant Roses.

Auguste Mie.....Pale shade of rose, full and cup-shaped.
Baronne Prevost.....Bright rose, very double, extra fine.
Baronne De Maynard.....Pure white.
Blanche Vibert.....Pure white, delicate grower.
Beauty of Waltham.....Crimson scarlet.
Caroline de Sansal.....Blush pink centre, free, summer blooming
Cardinal Patrizzi.....Brilliant crimson.
Clementine Duval.....Dwarf habit, clear rose color.
Comte de Paris.....Light crimson, lilac shade.
Comtesse Duchatel.....Deep carmine, splendid.
Eugene Appert.....Scarlet crimson.
Géant des Batailles.....Reddish crimson, splendid.
General Washington.....Scarlet crimson, very full, free.
General Forey.....Clear carmine red.
General Jacqueminot.....Purplish crimson, most brilliant.
General Lane.....Dark rose.
Imperatrice Josephine.....Light rose, very double.
Jules Margottin.....Bright scarlet crimson.
Joseph Vernot.....Light rose color.
John Hopper.....Deep shade of pink.
La Reine.....Satin rose, extra large.
Louis Verger.....Carmine crimson, splendid.
Louis Odier.....Bright salmon rose, fine form.
Le Lion des Combats.....Curious shade of purple.
Mrs. Reynolds.....Cupped carmine, extra fine.

Madame de Willermots.....Mauve shade of carmine.
Madame Victor Verdier.....Carmine, cupped.
Madame C. D'Islay.....Light rosy blush.
Madame Laffay.....Crimson, exceedingly fragrant.
Madame Trotter.....Bright pink, flowering in clusters.
Madame Rivers.....Silvery blush, splendid form.
Mrs. Charles Wood.....Brilliant red, changing to rose.
Oderic Vitalle.....Delicate rose, silvery shading.
Pæonia .....Reddish crimson, very profuse bloomer.
Purple of Orleans.....Purplish violet.
Pius 9th.....Crimson violet.
Princesse Mathilde.....Deep blush.
Queen Victoria .....Pale flesh color, tinted carmine.
Reine des Violettes.....Dark purplish violet.
Sydonie .....Light blush.
Souvenir de Count Cavour ....Dark, glossy crimson.
Triomphe de l'Exposition.....Crimson red, extra fine.
William Penn.....Light crimson, finely cupped.
Wm. Griffith.....Deep rose, splendid form.
Wm. Jess .....Light crimson, lilac tinge.
Yolande D'Arragon.....Blush, free summer bloomer.
Zelpha.....White, tinged blush.
Zoe .....Clear scarlet crimson, extra fine.

CLASS III.—Noisette.

Aimé Vibert.....Clear white, fine form.
America.....Straw color, shaded salmon.
Belle de Bordeaux .....Rose, violet shaded.
Chromatella ....Deep yellow, very tender.
Caroline de Marinesse.....Blush white, immense clusters.
Gloire de Dijon.....Blush white, buff centre.
Herbemont's Cluster.....Deep carmine, semi-double.
James Sprunt.....Deep crimson. [extra.
Lamaraque.....Large, double; white, yellowish centre,
Minette .....Light crimson, very double, large clusters.
Madame Deslongchamps.....Pure white.
Marshal Niel.....Large and full, deep yellow, extra.
Ophir.....Salmon, shaded orange; distinct.
Oteri.....Orange, shaded pink; dwarf. [thers.
Rosamond.....Bright crimson, semi-double, yellow an
Smithii.....Pure yellow, slender grower.
Susanna.....Yellowish white, strong grower.
Souvenir d'Anscleme.....Deep carmine, vigorous grower.
Sarmentosa.....Flesh color, large, full, very fine.
Solfaterre.....Deep straw color, large, extra fine.
Sir Walter Scott.. .....Dark purple, strong grower.
Setina.....Clear pink, large and full.

Washington.....Pure white, semi-double, large clusters.
Triumphant.....Large, double rose, vigorous.
Well's Pink.....Rich full clusters of carmine rose.
Zobede.....Crimson and purple shaded.

Bourbon.

Bosanquet.....Rich blush, free grower and bloomer.
Bouquet de Flore.....Deep carmine, large and fragrant.
Cardinal Fesch.....Deep crimson purple.
Crimson Globe.....Purplish crimson, strong grower.
De Tourville.....Purplish carmine, very fine.
Duc de Chartres.....Large, double; crimson.
Edouard Defosses.....Bright rose, cup-shaped.
George Cuvier.....Rosy carmine, splendid form.
Glory of Algiers.....Bright crimson.
Henri Plantier.....Deep pink, splendid shape.
Henry Clay.....Pale blush.
Hermosa.....Light rose, one of the most popular.
Jules Farfait.....Rosy purple, fine form, extra.
Jupiter.....Rich shade of crimson violet.
Leveson Gower.....Salmon rose, very large and double.
Madam Neuman.....Purplish crimson.
Paul Joseph.....Splendid crimson, but weak grower.
Phœnix.....Deep rose, with fragrance of Damask.
Pierre de St. Cyr.....Pale pink, strong grower.
Proserpine.....Light carmine, very fragrant.
Psyche.....Light rose, very double, excellent.
Queen of Bourbons.....Rich blush, very dwarf habit.
Splendens.....Splendid crimson, vigorous.
Souvenir de la Malmaison.....Flesh color, very double, splendid. [best.
Sombriel.....Blush white, strong grower, one of the
Vicomte de Cassy.....Cherry red, vigorous grower.
Vulcan.....Deep shade of carmine.

Tea.

Adam.....Rich rose, salmon shaded, extra.
Alphonsine.....Deep pink, fine form.
Aurora.....Yellow, shaded rose.
Bella.....Pure white, tea-scented.
Belle Allemande.....Blush, tinted rose.
Buret.....Large; deep pink.
Bon Silene.....Large; rich pink.
Camellia Blanche.....Pure white.
Cortas.....Blush, mottled pink.
Caroline.....Pale rose, deep carmine centre.
Chas. Reybaud.....Salmon, tinted lilac.
Chrysocome.....Yellow, shaded orange.

Clara Sylvain.....Pure white, extra fine.
Devoniensis.....Blush; magnolia fragrance; delicate.
Fleur de Cygnes.....French white, profuse bloomer.
Isabella Sprunt.....Clear canary yellow.
Louise de Savoy.....Deep yellow, delicate.
Le Pactole.....Canary yellow.
Melville.....Pinkish lilac.
Marie de Ban.....Rich blush.
Madame Maurin.....Pure white.
Madame Bravy.....Globular, white.
Madame Falcot.....Orange yellow, very free.
Nina.....Large; pinkish violet.
Olympe Fraguip.....Sulphur yellow.
Pauline Labonté.....Light blush.
Rubens.....Yellowish blush.
Souvenir d'un Ami.....Light lilac.
Soette.....French white.
Safrano.....Orange yellow.
White Tea.....

Bengal.

Appoline.....Cupped carmine.
Agrippina.....Bright crimson.
Bourbon Queen.....Rich blush.
Beau Carmine.....Light crimson.
Bosanquet.....Blush white.
Comte Bobinsky.....Rich carmine.
Ct. De Rohan.....Purplish red.
Cramoise Superior.....Purplish crimson.
Douglas.....Rich violet.
Louis Philippe.....Light crimson.
Leondis.....Rosy red.
Madame Morel.....Cream color, centre pink.
Madame Rohan.....Pure white.
Napoleon.....Blush, extra large.
Romeo.....Dark reddish-crimson.
Sully.....Pale rose, tinted salmon.
Virginale.....Rose and crimson.
Vesuvius.....Brilliant crimson.

PROPAGATION AND CULTURE.

The soil best suited to the Rose is a rather stiff loam, although it is by no means particular about soils, and is often seen growing in nearly equal luxuriance in those widely different; in stiff clayey loam, however, flowers

of more substance and depth of coloring will be produced than in that of a light or sandy character.

The propagation of the Rose is a matter of much interest, not only to the professional florist but to the amateur who wishes to increase his plants. The method in use by florists in this country is usually by cuttings, directions for which will be found among the general instructions given under the head of "Propagation of Plants by Cuttings."

Roses from ripened or hard wood may be propagated, the operation being performed at any time from October to January. The cuttings are usually made with three or four eyes, just after the wood is ripened enough to show the development of the buds at the axil of the leaf. The method we have most successfully practiced is to place cuttings in cold frames, such as are formed on the surface of the ground, and are used for wintering cabbage, and cauliflower, planting the cuttings exactly as we would do those plants, and subjecting them to the same winter treatment of airing, yet keeping them as free from severe freezing as can be done during winter. Rose cuttings placed in such frames about the end of October will be rooted and fit to pot in March. Those not having the convenience of frames may do it equally well with the protection of the ordinary garden hand glass. In either case it is necessary that the soil be thoroughly drained so that no water stand on it in winter. If the soil in which they are placed is not naturally sandy, it had better be prepared in about equal proportions of sand, leaf mould, and loam, well mixed together. The cuttings should be inserted quite thickly, say from $^1|_2$ to 1 inch apart, and at distances of about 3 inches between the rows. This space is sufficient to allow the soil to be firmly pressed about the cuttings, as the process of placing them goes on. One thorough watering, when put in to settle the soil closely around them, will usually be all that is necessary

until they begin to root in spring. Cuttings planted in this manner in October or November, and kept merely from freezing during winter, will be rooted in March, presenting the appearance shown in figure 39.

The success much depends on the varieties and fit condition of the cuttings, for we find that in a collection of 50 sorts, every cutting of some varieties will root, while in others we fail to get more than 5 per cent. But if properly treated it may be safe to expect 50 per cent of rooted cuttings as an average. As soon as, or even before, they show the extent of root indicated in the engraving, they should be potted in two-inch pots, shaded and watered for a few days and gradually hardened off by exposing them to the air, when they will be sufficiently rooted to plant in the open ground in April or May. Some propagators plant them at once from the cutting bed to the open ground, but this is attended with risk, for unless the weather is continuously favorable for two or three days one-half of them may be lost. We have always found that placing them in pots and keeping them under the protection of sashes for a few weeks well repaid the extra labor. Nearly all deciduous shrubs may be propagated in this manner, most of them even more successfully than the Rose.

Fig. 39.—CUTTING OF OLD WOOD.

The method best suited to the amateur or to those who have no propagating structures, is by layering.

This is done as shown in figure 40. It will be observed that the cut is made on the upper part of the shoot; the advantage of this is, that when the layer is detached from the parent plant, the tongue of the layer, or the part from which the roots are emitted, is less likely to be broken off than if the cut is made under or on the side. Layers of Roses may be made at any time from the middle of June to the middle of September, always using shoots of the young

Fig. 40.—LAYERING THE ROSE.

growth—that is, a growth of 3 or 4 weeks old, or such as are not so much ripened as to drop the leaves; or, in other words, the cut should always be made at that part of the shoot where there are as green and healthy leaves below as above the cut. This condition of the shoot is very important, in order to produce a well-rooted layer. By cutting lower down in the harder-ripened wood, roots will be produced, but the layers will be very inferior to those cut at about the point named. The same rule applies to the layering of shrubs of all kinds.

Another mode of layering not in general use is, to place the layer where the incision is made, in a 3 or 4-inch pot, sinking the pot in the ground to the level of the rim; all the roots being confined in the pot, when the layer is lifted no check is given, as there is no injury done to the small fibers. Layers so made may be planted out in the fall, and if a little mulching is given around the roots, not one plant in a hundred will fail; while if the layering is done

in the usual way, without pots, a heavy percentage is almost certain to be lost during the winter. To the florist without proper means of propagation, this method of layering Roses in pots will be found very advantageous, as every layer so made will make an excellent flowering-plant by spring, if kept in a green-house or frame during the winter, and will prove nearly as valuable to the purchaser as large one-year-old plants would. Roses are also propagated by budding in the usual way. Budding, like layering, may be performed on the Rose at any time during the season from June to September, although it is best to perform it either so early, say before the middle of July, that the buds will start and the shoots get time to ripen before frost, or so late, from the end of August to the 1st of October, that the buds will remain dormant until spring.

That the operation may be successful, it is essential that the stock be in thrifty growth, so that the bark will freely part from the stem, and, also, that the bud to be inserted be taken from a healthy-growing plant, the eye or bud at the axil of the leaf being well developed. There is quite a diversity of opinion among different operators whether the thin piece of wood should be removed from the bud before insertion. We have experimented extensively in both ways, and found but little difference in our success, and have finally settled down to the practice that if the bud is young and unripened, the wood be allowed to remain; if well ripened, it is taken out. In tying, we prefer the soft cotton used for lamp-wick in preference to any other material, as it expands with the growth of the shoot, doing away with the necessity of slacking the tie to prevent it from cutting the bark.

MONTHLY ROSES—HOW TO PRESERVE DURING WINTER.

The question is asked me many hundred times every season, "What kind of Roses shall I plant?" I invariably recommend the "Monthly," rather than the so-called

"Perpetual" varieties, which, with very few exceptions, sustain their "Perpetual" character by only once flowering freely, in June, with occasionally a few scattering flowers throughout the summer and fall. While with the monthly varieties, we have not only a monthly, but an almost daily supply of flowers, embracing far more variety of color, from June till November. There is no plant sold, which, for the first season, at least, is so unsatisfactory to the buyer as the Perpetual Rose; the purchaser in good faith believes that its name indicates a perpetual flowering character, and is woefully disappointed to find that the flowers or flower buds which are on it when purchased are nearly the last that are seen on it for that season. True, its entirely hardy nature, sustaining it unscathed through the winter, compensates for the first year's disappointment by a gorgeous bloom in June, but this is all; for the remainder of the season there is little ornamental about it. On the other hand, the Monthly Rose, the original types of which are natives of China, are evergreen and ever-blooming, if not arrested by severe frosts, for in the milder latitudes of our Southern States, they grow and bloom without cessation the entire season, unless, perhaps, for a month or two in extremely dry and hot weather in summer. But now comes the question, Are these Monthly Roses hardy in our Northern States? They are certainly not so with ordinary treatment, but I will briefly describe a very simple process by which they can be preserved in as good condition during winter as the hardiest Perpetual or Prairie Rose. The success of the plan, however, depends greatly on the condition of the soil in which they are growing. If it is naturally dry, having a gravelly or sandy subsoil, it is certain to succeed; but if wet and undrained, they cannot be saved by this or any other process. The operation is to remove three or four inches of soil from one side of the plant close up to the roots, and of a length and width

proportioned to the size of the bush, as represented by figure 41. The plant is next bent down into the excavation, and held in place by a few pegs, as shown in figure 42. It is then covered entirely, root and branches, by sods, placed grassy side upwards, and presents, when finished, a little hillock, in appearance like figure 43.

Fig. 41.—DIGGING THE TRENCH.

There is one very important condition to success, which is, the *time at which it is done.* Few of our rose amateurs have any idea of the amount of freezing that the most tender Tea Rose even, will sustain without injury, and would, in consequence, be apt to hurry to put their plants under their winter covering on the appearance of the first slight frost in October. This would most certainly prove fatal, by causing them to rot during the still warm autumn weather. We usually have frost in this part of the country in October to injure most green-house plants that are exposed. Yet I have never seen it severe enough to injure Roses of any kind before the middle of December, to which time the covering up should be delayed. Covering the ground, however, around the bushes with three or four inches of straw or leaves, to prevent the earth from being frozen, should be done a month earlier; this little precaution will allow of excavation at the time of covering with the sod. The time here given for the operation (the

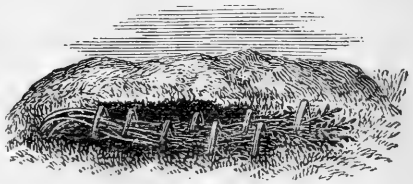


Fig. 42.—PEGGED DOWN.

Fig. 43.—COVERED FOR WINTER.

middle of December) is that best suited for the latitude of New York; sections to the north or south must be varied accordingly. Perhaps the best rule that can be given is, to delay the operation until the ground can no longer be plowed or dug with the spade. The covering of sod may be removed as soon as vegetation fairly starts in spring—for this section, say the middle of April—and the plants raised to the upright position and closely pruned. It will be understood that in the process of bending down, the roots are only disturbed slightly on the side that has been excavated; consequently they have nearly the full vigor of undisturbed roots, and the plants will grow in a way that will amply repay the little labor bestowed upon them. Every plant thus saved over has a value four-fold that of any thing which can be planted in spring, for the obvious reason that it has not had its roots disturbed by removal. This plan is a great improvement on that sometimes practised of digging them up and burying them in the fall, to be unearthed and again replanted in spring, for this cannot be done without mutilation of the root, and consequently diminished growth the next season. Plants of different kinds vary much in their ability to recuperate after planting, and few suffer more than the Rose; hence the necessity of practising the method recommended, in preference to that of digging them up. But a still worse plan is, for amateurs in gardening to lift their Rose plants and pot them in fall, and attempt to keep them in the house or cellar in winter; in nine cases out of ten they never live till spring, and if they do, only linger out a miserable and diseased existence. Roses are often expensive, and always valued plants, and we can well imagine how natural it is on the approach of cold weather to lift and pot them, and place them in the window of a *warm* sitting-room or parlor; but this kindness is killing to them, for they are not a kind of plant that desires heat at this season, or in this condition of their growth. It is still more delusive to

think that they can be lifted from the ground in fall and potted so that they will bloom during winter; perhaps by such treatment as can be given in a cool green-house or frame, they may be got to bloom by February or March, but they should never be forced into bloom earlier, unless they have been grown in pots during the summer previous.

The above is described as applied to a single plant, but a whole bed may be covered in the same manner.

ROSES IN POTS.

As millions of Roses are now sold in pots in spring, we will briefly state the method we have most successfully adopted in growing large numbers annually for the past dozen years. The plants used are those struck from cuttings in March and April, and planted out in the open ground in May; these make plants averaging 18 inches in height, with proportionate breadth, by the first of November. Although, as before stated, we make no special preparation of soil for any particular class of plants, we are always more careful that the soil used for Roses be fresh. While our regular mixture of decomposed sods and manure suits very well for plants generally when it is two or three years old, we prefer that for Roses to be but a few months cut from the field before it is used. In lifting up the plants from the ground, all possible care is taken to save the fibres from injury, and they are, on no consideration, ever allowed to be exposed to drying winds or to wilt in any way, being sprinkled at intervals while laying in the heaps in the potting shed. We prefer to prune (which we do with scissors) before potting; it is not only done twice as quickly, but it also relieves the plant at once from surplus shoots, and being, when pruned, more compact to handle, it can be potted in half the time. The pots used are from 4 to 8 inches in diameter, in propor-

tion to the size of the plants. The potting is done rather firmer than in most plants, the Rose preferring a stiff soil. When potted, they are freely watered; shaded, if sunny, and kept close for 8 or 10 days. Now comes the most important point, the place in which they are to be kept during winter. This must be where they will not be excited into growth; an ordinary green-house temperature, suited for Geraniums or Fuchsias, would be destructive to Roses in their dormant state, when they are without "working roots." If kept in a green-house at all, its temperature should never exceed 40° at night, with fire-heat, and if it falls down to 32°, now and then, it will do no harm. But this kind of temperature can be best obtained in a cold pit or frame, where there is no flue or pipes, or other means of heating. These pits should be sunk from 18 inches to 2 feet below the level of the ground, in some sheltered spot, facing south, and, above all, so situated that no water will stand in the bottom of the pit; if not naturally dry, it must be made so by thorough draining. The Roses placed in the pit should be plunged to the rim of the pots in tan bark, sawdust, coal ashes, or some such material. Air should be given at all times when the weather will permit, and the sashes covered sufficiently at night to prevent the plants being frozen much; a slight frost may not injure, but they will be safer and better if never frozen at all. In severe snow-storms, the plants being in a dormant state, there is no occasion to uncover for two or three weeks, unless to take precautions against the inroads of mice or rats, which are often destructive. We allow the Roses, when placed in frames, to remain in them until the middle of February, by which time they have formed young rootlets, and will then stand the higher temperature of the green-house, to which they are then brought to get them in shape to force into bloom, so as to be in salable condition in April and May.

ROSES FOR WINTER BLOOMING.

Roses for winter blooming require a different treatment, as one essential condition of forcing for flower is that the plant has abundance of active, or, as we term them, "working roots." For this reason, Roses required for winter blooming are either planted out in prepared borders in the green-house in spring or early summer, or else grown in pots throughout the summer, so that by fall the plant is supplied with an abundance of "working roots." Plants are started for this purpose either by cuttings struck in March, or else the year-old plants are used; but in either case, care must be taken that shiftings are made sufficiently often during the season to prevent the roots becoming what is termed pot-bound. In this condition, there is a matting of hard roots formed around the ball of soil, and touching the sides of the pot. Whenever the fibres begin to lose their whiteness and become hard and woody, their power of absorption, to a great extent, ceases, and, in consequence, we at once have a loss of vigor in the plant. For this same reason, every care must be taken to have the plants supplied with moisture during the hot, dry days of summer, for, if once allowed to wilt, you have dried up the white, working roots, and before the plant can regain its impaired vigor, new ones must be formed. We find that when we dig up a Rose plant in November, and pot it with all the care possible, we cannot get it to regain its vigor, unless it is kept at the low temperature previously recommended until nature has repaired the destruction of the feeding roots, which occurred in digging it up. By attempting to force it into flower, by placing it in a high temperature in this condition, you will either kill it outright, or else cause it to produce a few feeble and abortive shoots and flowers. But the case is very different if the plant has been so treated as to have an abundance of active roots; its system is in full vigor, and it will

continue to produce shoots and flowers in profusion during any part of fall or winter, at the will of the operator, proper judgment being used to prune in the plants previous to the desired time of flowering. Thus, if Rose-buds are wanted at the first of January, it will be necessary to prune off or shorten the shoots about November 1st; they may then be put into a temperature ranging from 50° to 60°, at night, with 15° higher during the day, plentifully syringed, but sparingly supplied with water at the roots until they begin to grow freely. In the summer treatment, I have omitted to state that the plants should be at all times fully exposed to the sun, but, to counteract the drying up from this exposure, the pots should be plunged to the rim in sawdust, refuse hops, tan bark, sand, or some such material, as is most convenient. Another plan that may be adopted when it is not convenient to carry the Roses through the summer in pots, is to lift up and pot those planted out early in the fall, say by the middle of September, or, at latest, the first of October; if carefully lifted thus early, and kept from wilting, they will have filled the pots with working roots by November, and will make plants nearly as good for forcing as those grown throughout the entire summer in pots. For this purpose, two-year-old plants are much better than those only one year old, as, having more fibres, they more quickly form the essential "working" roots.

In 1870 we built a green-house for roses, 300 feet long and 21 feet in width, of which figure 44 is an end section. It differs from that figured on page 65 in being one foot wider and having the back and middle bench on the same level, which we find to be of convenience in working, besides giving the roses a better chance to grow higher. The question of the walls for such a structure as this is a very important one. We find that if brick is to be used for the north or back wall, it must be made hollow, as a solid wall of even one foot in thickness will

not stand the extremes of temperature between the outside and inside; but as a hollow wall is an expensive matter, I would recommend to those with whom economy is an object to construct the walls thus: Get strong locust, chestnut, or cedar posts, of length sufficient to allow them to set 3 feet in the ground; place these 6 feet apart; outside of these nail hemlock or other rough boards; against this tack a layer of asphalt or tarred paper, and then against the paper nail the weather-boarding, finishing at the top with a hollowed-out timber,

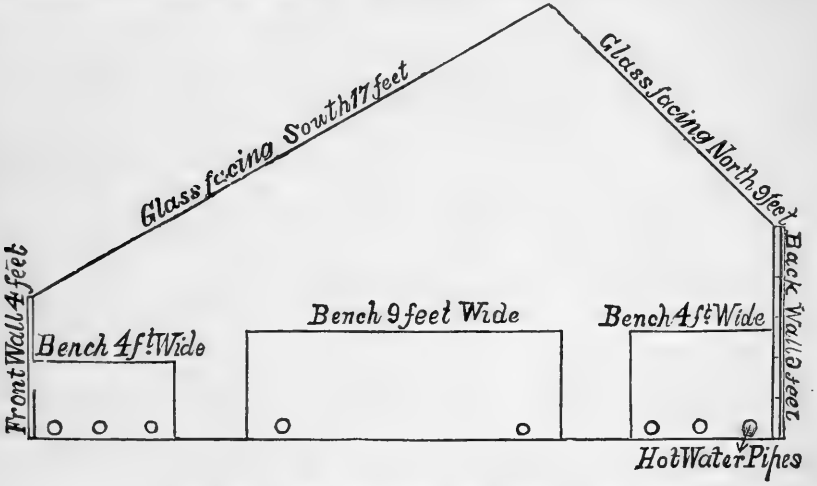


Fig. 44.—END SECTION OF ROSE-HOUSE.

6 or 8 inches wide, for a gutter. A green-house of this kind, heating apparatus, and all complete, will cost at present prices from $20 to $25 per running foot; with hollow brick walls, it would cost about $30 per running foot. The use of tarred paper for green-house walls is only a recent one; formerly we used to fill in with brick, or use double boarding, leaving a space of two or three inches, which was filled in with charcoal, sawdust, or some other non-conducting material; but the tarred paper is by far the cheaper and better. The rose-house we erected last year contains about 5,000 plants, grown in 10 and 12-inch pots, occupying about a square foot of space for each

plant. No plants could possibly be in better health and vigor; and the amount of rose-buds gathered from October to May, 30 weeks, averaged about 2,000 buds per week. At New York rates, which are very low—say $6 per 100—this would give about $3,600 for the crop. The varieties grown I will name in the order of their value here: *Safrano* (orange yellow), *Isabella Sprunt* (canary yellow), *Bon Silene* (carmine purple), and *Bella* (white). These are all Tea-roses, and the varieties most valued for forcing; *Bon Silene* is the favorite, and is largely grown about Boston. One florist there sent last New Year's Day, 1872, to the bouquet-makers of New York 1,200, for which he received $300, or $25 per 100. This variety, from its delicious odor and rare and bright shade of color, is generally of twice the value of any other; but against this advantage is the fact that it is less prolific of bloom, scarcely yielding half the number of flowers in a given space as any of the others named. The method of summer preparation for forcing is to secure good healthy young plants that have been propagated in March or April; these, when first taken from the cutting-bench, are placed in 2 or 3-inch pots; if rooted in March, they will have filled the small pots with roots by the middle of April; if in April, by middle of May. In either case they should be shifted into larger pots as soon as the ball of soil has been filled with white roots; if left too long unshifted, the roots become brown in color, and of a hard, woody nature; if in this condition they become checked in growth, they never afterward make so fine plants. Of course, until the middle of May, these shiftings of the young plants must be done under glass, but after that time they should be placed in beds of convenient width, say 4 or 5 feet, in some free and airy situation. When first shifted from a smaller to a larger pot, the plants should be placed close together, the rims of the pots touching; but as they begin to grow freely the pots

should be drawn apart, so that the rims stand an inch or so clear of each other. This is very important, in order to admit free circulation of air around the sides of the pots, and develop strong and healthy roots. Until the middle of June we stand the pots on the surface of the ground; but about that time it is necessary to plunge the pots to the rim in sand, coal-ashes, waste tan-bark, or some such dry and light material. If this is not done they can hardly be kept damp enough; and the intense heat of the sun beating down on the sides of the pots dries up the young rootlets. It is necessary that the beds wherein the Roses are plunged should be so arranged that no water will lodge at the roots, as that would be quickly fatal. Last fall we found it necessary, after a heavy rain-storm, to lift the pots out of the sand in which they had been plunged, to allow them to dry. Forty-eight hours of heavy rain would have killed the young roots. It is also essential to watch that the roots do not get through the bottom of the pot; to prevent this, they should be turned around at least every ten days, to break off any roots that may have run through. It will be understood that continued shiftings into larger pots are necessary during intervals of four or five weeks during the summer, until September, by which time, if well grown, they will be of sufficient size to require pots of 10 or 12 inches in diameter. If it is preferred that the roses be planted out for winter flowering, it should be done in August, and in solid beds in the green-house not on board benches. We never shift them after middle of September, as the roots they have then made are sufficient to carry them through the winter and spring, stimulated, however, by water drained from the manure heap, which we use twice a week, from January on to May, diluted to the color of strong tea. The expenses attendant on the cultivation, and the interest on the investment of this rose-house the past season, were about as follows:

First cost of stock, if it had to be bought, 5,000 roses at 10 cts..	$500
Interest on $6,000, at 12 per cent.....	720
Labor of one man for the year.....	500
80 tons coal, at $6.....	480
	$2,200
Receipts for the year.....	3,600
Profit.....	$1,400

The second year, of course, the expense of buying stock would not come in, as the plants would be in better order the second and even the third year than the first; besides, if young plants are wanted for sale, they might be propagated in any quantity from the flowering plants.

We built in spring of 1872 two houses, each 20 feet wide by 100 in length, for the winter flowering of Roses, that have answered the purpose so well, and besides the construction is such that it may be adapted to almost any kind of a plant house or for a grapery, that we give the plan here, believing it will be found well suited for many purposes. Figure 46 shows the elevation of a portion of one of these houses, and figure 45 the ground plan. As we use it, the centre bed is prepared exactly as if for a grapery border, the *bottom* of the bed is level with the walk, plastered over with an inch or two of cement (to keep the roots from going down to the cold subsoil), sloping to each side so as to give rapid drainage through openings that are left in the *bottom* of the 8-inch wall which forms the bed. The height of this wall is 20 inches, making the bed or border of that depth. The materials that we formed the border of were 3 parts decomposed sod, 2 parts scraping from a paved street and 1 part well rotted cow manure. The street scrapings are not specially necessary, and may be dispensed with when not procurable, using all sod instead. The Roses, which are the usual winter flowering sorts, have done excellently. The side benches of the house under which run the pipes

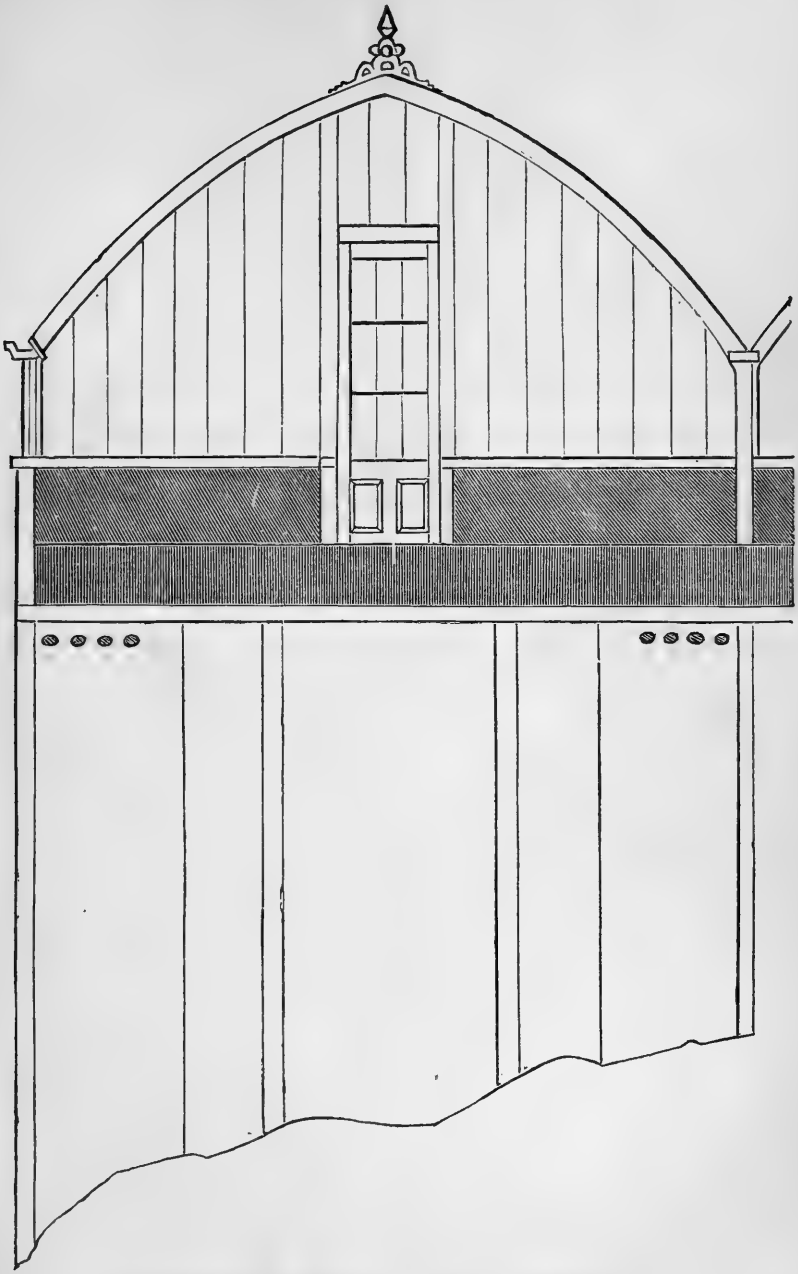


Fig. 45.—END VIEW AND PLAN OF ROSE-HOUSE.

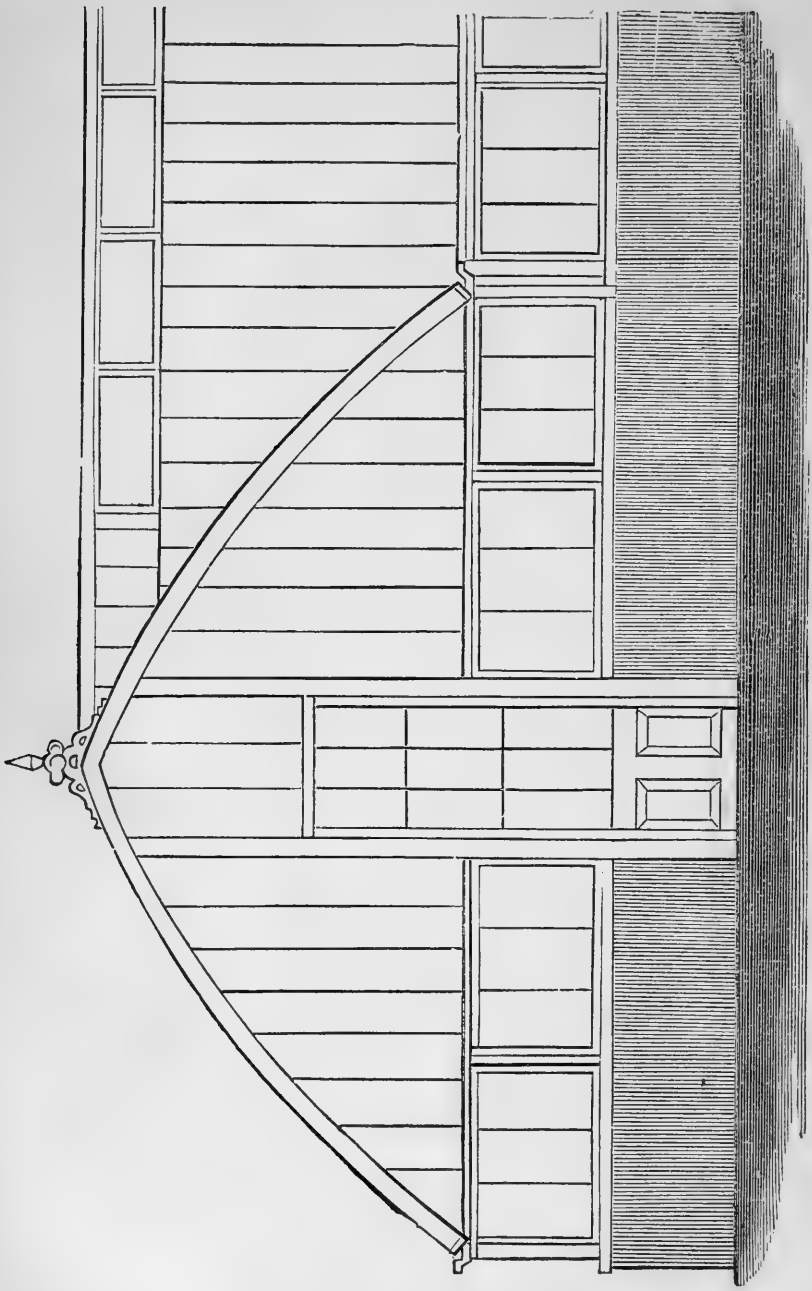


Fig. 46.—ELEVATION OF ROSE-HOUSE (IN PART).

are about 3 feet from the walk, giving room enough from the glass to grow plants from 2 to 3 feet in height. We have used these benches exclusively for growing Roses in pots, but they may be used, of course, for any other plants requiring the same temperature as the Roses. At the end of the house to the north is placed the furnace pit and sheds, so that the other end is due South. This we think the best aspect for an equal span-roofed green-house. When it is a "half-span," then the long side should be due East the *ends* being North and South. The cost of each style is nearly similar and will be found estimated for the "half-span" style at page 131. Ventilation is given by "lifting sashes" along the roof on the ***East side*** of both kinds of green-houses by means of a patent ventilator. In this ventilator a jointed iron arm is fastened to each sash, and the other end of the arm is attached to an iron shaft that runs horizontally the whole length of the house close to the roof. By means of a crank placed in a convenient position and proper gearing the shaft is made to revolve, and this acting upon the arms lifts the sashes simultaneously. But very little exertion is required to move it, and the ventilators can with the greatest ease be opened a mere crack or to their fullest extent. Either of these styles of span-roofed green-houses, would be more economical to have the width 22 or 24 feet rather than 20, so that the centre bed for Roses might be wider.

There are comparatively few varieties of Roses suitable for producing flowers in sufficient abundance in winter to make it profitable, and these few are such as in the summer months are by no means our finest; but they are selected for winter, not for their developed flowers, but for their buds. Thus the Safrano, one of the most valued for its saffron yellow buds, is but semi-double. Those most valued by the New York florists are:

Lamarque.—White, with a tinge of straw color in the center; a vigorous grower, usually trained up the rafters.

Thousands of feet of green-house are devoted exclusively to this variety.

Solfaterre.—A bright straw color, of growth similar to Lamarque, but more shy of flowering, and on this account grown only in limited numbers.

James Sprunt, or Climbing Agrippina.—Rich dark crimson.

Safrano.—Saffron yellow; abundant bloomer; of rich Tea odor; the one grown next to Lamarque in greatest abundance.

Isabella Sprunt.—Exactly like Safrano, except in color, which is a bright canary yellow.

Agrippina.—Rich deep crimson, with an occasional splash of white through the centre.

Le Phœnix.—Deep shade of carmine; most abundant bloomer, with the rich fragrance of the damask or moss.

Duchess de Brabant.—Color, light carmine shade; a very pleasing, lively color, and the most abundant bloomer of any yet named; Tea-scented. We value this variety so highly, both for summer and winter flowering, that we have grown ten thousand plants of it alone this season.

Hermosa.—Another favorite variety, with rosy pink flowers; most prolific flowering variety.

Pauline Labonte.—Light blush or cream color, similar in style of growth and shape of flower to La Pactole.

Bon Silene.—A variety largely grown in the vicinity of Boston; of a deep salmon shade of pink, of rich tea fragrance, and of large size; the bud often two inches long.

Gloire de Dijon.—Large, full; buff, shaded with salmon.

Marshal Niel.—This we include from its distinctive color of deep yellow and its large and handsome bud more than for its productive qualities. It has now been tried sufficiently to thoroughly test it, and from what we have

seen we are inclined to think it will be retained as a first class forcing rose.

The greatest pest we have to contend with in Rose culture is *mildew*. Opinions as to its cause are varied and contradictory. The theory is that mildew being a fungoid growth the seeds of which are ever present in the atmosphere, when a relaxed condition of the plant ensues the minute seeds find a suitable place for their development in the enfeebled leaf. Therefore we believe that any thing that impedes the flow of the sap places the plant in that condition fitted to develop mildew. Thus we often see our Roses without a taint of mildew during all the winter and early spring months, until the hot, dry days of the middle or end of May dry the soil in the pots to such a degree that the plant wilts—the sap is impeded, and mildew follows. Or a door is left open and the frosty air fastens on the stems and leaves, congeals the sap, enfeebles the plant, and though from an entirely opposite cause, the result is the same.

I once had a most marked example of this kind. Early in April, we had an old-fashioned lean-to green-house filled with Roses in full leaf, in the very highest state of vigor. The house was some sixty feet in length and was ventilated by sliding down every alternate sash at the top. In ventilating on one occasion, the sashes had been neglected until so late in the evening that the Roses exposed to the air had become chilled by frost so that the young shoots hung down as if wilted; as the green-house got heated up they recovered, and to all appearance next morning looked none the worse for being frozen; but in a week after, mildew appeared in a clearly defined square space of about 3x3 feet, following almost exactly in the line where the plants had been frozen.

Had the sap been arrested by the roots getting dry in that condition of growth, no doubt the result would have been the same

Like most other diseases, mildew is best met by prevention rather than cure, and for this reason all care should be taken to avoid the extremes referred to, and, as far as possible, to avoid great variation of temperature. Sulphur is applied in various ways to destroy mildew, but will often fail if the disease has gained much headway. The best way is to use it mildly as a preventive. This is done by boiling 3 lbs. of sulphur and 3 lbs. of lime in 6 gallons of water until it is reduced to 2 gallons; allow the liquid to settle until it gets clear, then put it in a jar or bottle it for use. One gill of this is mixed in 5 gallons of water and syringed over the Roses in the evening. Applied in this weak state it does not injure the leaves, and yet has the effect of preventing mildew, if perseveringly attended to, as the seeds of mildew seemingly cannot vegetate in an atmosphere or in a soil impregnated with sulphur.

Roses, when grown in pots, particularly in cold pits, are often much troubled by the common angle-worm. An effective means of destroying them is to slake a peck of lime in 50 gallons of water, and water the plants freely with the liquid after it has become clear.

CHAPTER XX.

CULTIVATION OF THE VERBENA

I much doubt if there is another chapter in this work in which so much interest will be taken by many gardeners as in this, for hundreds of them, entirely successful in all other operations, signally fail with the Verbena. As it is known to thousands that in this matter we have *always* been successful, they will have interest in knowing what our peculiar mode of culture is that thus far has exempted us from the disease affecting this plant — known as

"black rust,"—and enabled us to grow it for nearly twenty years untainted by disease. I will make the starting-point the first of April. At that date take cuttings from healthy plants; see that they are taken in the condition described in the Chapter on Propagation—that is, that they are in such a state that they will *break on being bent.* They will root fit to be potted off, in eight or ten days, and will be fine, healthy plants to put in the open ground in thirty days after. Verbenas are not at all particular about soil, provided it is not water-soaked; we have planted them on soils varying from almost pure sand to heavy clay, and, provided it was enriched by manure, there was but little difference in the growth or bloom. Planted out in May, by August they will have spread to a distance of three feet, the plants profusely covered with flowers and seed pods. Now at this time, say the middle of August, this profuse flowering and seeding seems to lessen the vitality of the plant and put it in the condition to invite the attack of the "black rust" producing insect. To sustain the vitality of the plant and recuperate its exhausted forces, we cut back the extremities of the shoots some six inches, in all plants from which we design to propagate, free the plants of decayed leaves, and thin out where too thick at the centre. Then we fork up the soil around each plant, adding a compost of equal parts of fresh soil and rotted manure to the depth of two or three inches. Young shoots, as they develop, root into this with avidity, producing a *soft* and *healthy* growth, which by the first or middle of October, gives us just the style of cutting we require. Now the process of propagation begins, which may be carried on either in the propagating house, in the usual way, or by the saucer system, as before described; but by whichever method the propagation is effected, let me again mention the importance of taking the cutting in that succulent condition in which *it will snap on being bent.*

Do not attempt to pot the old plant or the layers of the

Verbena, or even to take a shoot for a cutting which has formed a root in the ground; for in most cases the roots so formed are so low down that the shoot is hard and woody at that point, and will not be likely to produce such roots as will give a healthy growth. It is by starting wrong in the fall, and impairing the vitality of the plant, and placing it in an enfeebled state, that disease is invited.

In the directions given in the Chapter on Propagation great importance is attached to the necessity of potting off cuttings immediately on being rooted. If this is necessary with any plant, it is especially so with the Verbena, as no plant is more susceptible of injury from allowing the roots to become elongated and hardened in the cutting bench. Cuttings thus neglected make hard, slim plants, which, even if they do escape the insect pest, are not likely to make thrifty plants. On potting the cuttings, they are placed in a green-house or frame, and shaded in the usual way for two or three days or as long as the condition of the weather may require. As soon as they have struck root in the soil of the pots, they should be kept cool, and abundantly supplied with air by tilting up or letting down the sash.

No fire heat need be given, except sufficient to keep them from freezing, and if a temperature can be sustained throughout the entire winter months ranging from 40° to 45°, at night, and not to exceed 10° higher during the day until the beginning of March, there is no doubt whatever of having a healthy and vigorous stock, providing proper attention has been given to watering and to fumigation by tobacco. Watering we do by force-pump and hose, as elsewhere described, drenching the plants thoroughly overhead by a sprinkler, whenever they show indications of being dry.

Continued fumigation is of the utmost importance in the culture of all plants under glass, but it is perfectly indispensable to the welfare of the Verbena. In all our Verbe-

na houses we fumigate, on an average, two or three times each week; we do not wait to see the aphis or green fly, but apply the antidote solely as a preventive. No omission is so inexcusable as that of permitting plants to be injured by this insect.

Although I have elsewhere stated (see chapter on Insects) that the very minute one which produces the troublesome "black rust" on the Verbena seems invulnerable to the fumes of tobacco smoke, yet I have a belief that our unremitting practice of fumigating may be, after all, the true reason of our exemption from its attack; for although this insect may have the faculty of imbedding itself in the leaf on the approach of danger, its eggs, being stationary and exposed, may be destroyed by the action of the smoke; at all events, we have repeatedly brought varieties of Verbena severely affected by the rust into our collection, which in a few weeks appear entirely free from the disease, showing that our treatment in some way or other destroyed the enemy.

There is no question that this insect, so fatal to the health of the Verbena, is most active and destructive in a high temperature; hence we find that whenever Verbenas are kept in a mixed green-house collection, where Fuchsias, Pelargoniums, Heliotropes, etc., are grown (usually in night temperature of 55° or 60°), the Verbena becomes affected by black rust; showing that its minute enemy is at work sapping its life-current.

Verbenas, whether grown for sale or for private use, if we would have plants in fine health and vigor in May, should not be propagated sooner than January. To be sure, the "stock" plants, to produce the cuttings, must be raised previous, in October or November, but such plants become exhausted by spring and are inferior to later propagations.

In our own practice the necessities of our business require us to put in an uniform number of cuttings every two weeks from November to April; the last lot, which we put

off at the end of April, usually making the finest plants. The raising of Verbenas from seed is described in Chapter XV.

It is useless to particularize the varieties of the Verbena, as the yearly improvement by new seedlings is such that those we designate as the finest to-day, will, perhaps, in five years be deemed unworthy of cultivation.

CHAPTER XXI.

CULTURE OF THE TUBEROSE.

I know of no flower that is so generally admired, and that is yearly planted with so much uncertainty of blooming as the *Tuberose*. The amateur plants his bulbs of Hyacinths, Tulips, or Gladiolus, and is just as certain of a bloom following in due season as he is that the summer will follow the spring. But it is not so with his Tuberose bulbs; unpleasant experience has too often told him that after selecting the sunniest spot in his flower bed, and planting with the greatest care, instead of flowers he is rewarded

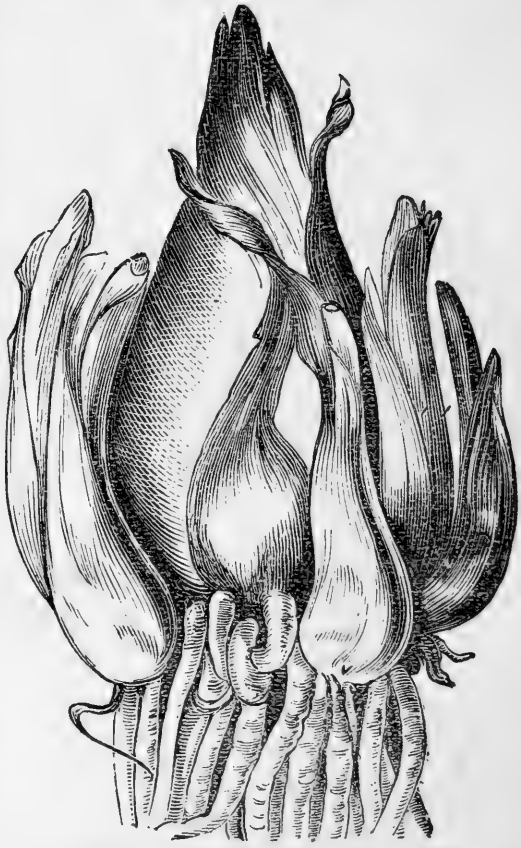


Fig. 47.—TUBEROSE BULB WITH SETS.

only by a mass of rank, green leaves. Now, as in most mishaps in amateur horticulture, the cause is a very simple one; the knowledge in this case is easily imparted, and failure need never occur. In the selection of the bulbs, reject all that do not show signs of vegetation from the

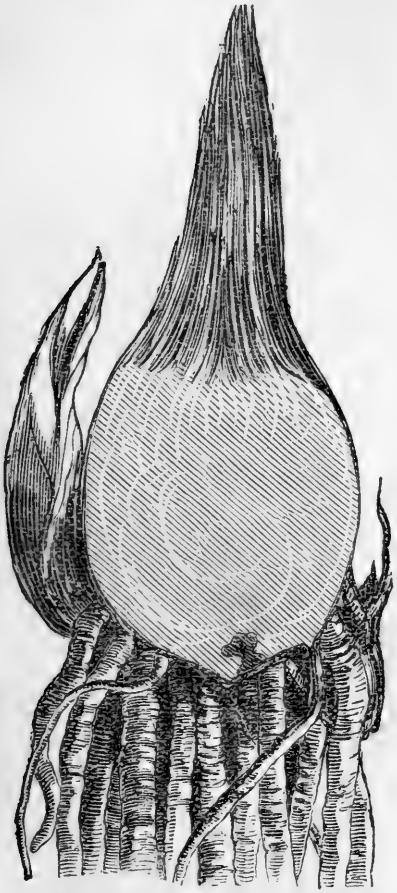


Fig. 48.—SOUND BULB.

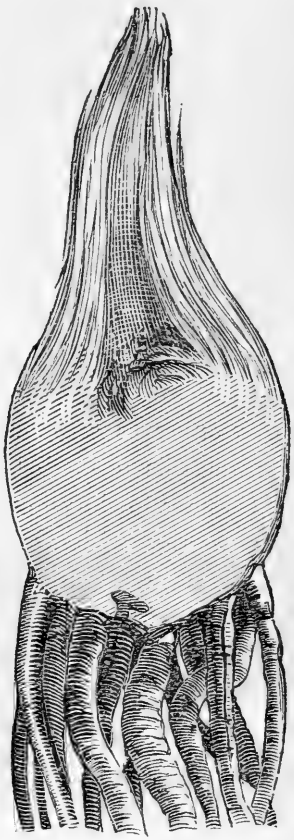


Fig. 49.—BULB DECAYED AT CENTER.

centre bulb. It is true that they will occasionally flower even when the centre does not show green, but it is always doubtful, even to us of the trade. Figure 47 shows a bulb as it is taken up by the cultivator in the fall—a large centre bulb with several smaller ones, or "sets," attached.

The large bulb only is that which produces the flower, and if that has rotted in the centre sufficient to destroy the flower germ, it will not bloom. Figure 48 shows a perfect bulb cut longitudinally; Figure 49, one in which the centre has decayed.

Now, in lifting the bulbs in fall, every bulb is then perfect, that is, large enough to flower; those figured are about the medium natural size. I am satisfied beyond all doubt that the cause of decay and consequent failure to flower in the Tuberose is its being kept in too low a temperature during winter. It is supposed, generally, that it is enough to keep it dry and free from frost, as we keep potatoes in a cellar. But unfortunate experience has demonstrated to me, by a loss of some thousands of dollars, that this is not enough; the bulbs must be kept both dry and *warm*, from October until May. If they are allowed to remain for any length of time in a temperature less than 50°, the centre or flower germ will be destroyed, though the outward appearance of the bulb to the uninitiated would be the same. For those who have green-houses, the best place to keep them is alongside the flue or hot water pipes; for those who have not, the shelves in a closet of any well-warmed room will suffice. The Tuberose is now a plant of rising importance for market purposes. I have no doubt that 5 million roots are grown annually in the vicinity of New York. The greater part of these are grown by the florists to supply the bouquet makers with this most important item in the construction of their baskets of flowers, bouquets, vases, etc., etc. Tuberose flowers are now produced nearly all the year round, and sell at wholesale from $1 to $10 per 100 florets, according to the season, the price being the highest during the holidays. Each spike averages 20 florets or single flowers, so that at some seasons the flowers of a single root of this common bulb produce $2 at wholesale.

Cultivating the Bulbs.—Our mode is very simple. After the ground has been well manured and spaded, or plowed, lines are struck out one foot apart; the small bulbs or "sets" (see fig 50,) are then planted six inches apart, and at least *four inches below the surface;* this we consider of great importance, as it tends to solidify the neck of the bulb, and thereby prevent the disposition to decay. Our time of planting here is about the 1st of June, but as they do not begin to grow for nearly four weeks after planting, it is necessary to hoe and rake the ground once or twice before they come up, to prevent the growth of weeds, which would otherwise quickly choke them in their feeble state. The bulbs are matured by the end of October; the tops are then cut off (but not too close,) and the roots at once placed in a warm and dry place.

Fig. 50.

Producing Flowers.—To secure a continuous bloom of the Tuberose, the first roots should be started in January, first removing all side shoots or offsets, in a temperature not less than 65°, and if kept regularly not below that temperature, they will flower in May. Those which are wanted to flower outdoors, and which are of most interest to general readers, should be started in a greenhouse, hot-bed, or warm room, not sooner than the 1st of May, and planted out in the flower borders three or four weeks after; thus treated, they will begin to bloom in August, and continue to bloom for two months. In warmer sections of the country there is no necessity for this forwarding treatment, as there the dry bulb planted out in May will flower freely during the autumn months. For a later succession of flowers, say for the months of November,

December, and January, the bulbs should be kept dry, and planted by the first or middle of August. These, of course, must be grown in the hot-house or green-house, as the Tuberose is a plant requiring at all times a high temperature.

To give a gradual succession it has been our own practice for the past four years to plant the dry bulbs on the green-house benches on July 20th, August 5th, and August 20th, the last lot coming in about Christmas.

Another plan now very extensively practiced by our New York florists, to produce flowers from February to May, to succeed and precede those planted from the dry bulbs, is to lift the strongest growing bulbs that can be selected from the patch in fall before frost. They are dug up carefully, first detaching all side shoots, so that a good ball of soil adheres to the root. They are then either planted in pots 7 or 8 inches in diameter, or planted at once on the benches of the hot-house in 6 inches of well prepared soil, at about 5 or 6 inches apart. They are then shaded and freely watered for a few days, until they have struck out roots sufficient to sustain them without wilting. So long as the weather continues mild, the protection of the glass will be sufficiently warm for them at night; but on the approach of colder weather, firing must be resorted to, and continued, so that the temperature shall at no time fall lower than 50° at night, and the nearer that it can be kept to 60°, as an average, the better. It will be understood that under these benches on which the Tuberoses are planted run the pipes or flues, so that the temperature of the soil in which they are growing is usually 5 degrees higher than the atmosphere of the hot-house at night, which is one of the main features of success in forcing the Tuberose. Great care is necessary in airing, which should not be done until the atmosphere of the house is at 70°, and the nearer that point can be kept to during the day the better; above all things any

continuance of a low temperature is to be avoided, as the Tuberose is a plant that succeeds only in a sub-tropical atmosphere. When not grown in a house specially adapted for the purpose, the ordinary stove or hot-house will suffice. When the flower stem is developed, they should on no consideration be allowed to get dry at the roots, else a whole or part of the flower buds will shrivel up. Whether the bulb has been grown to flower in open air or forced in the hot-house, after it has once flowered it is of no further value as a flowering root; the bulb having once flowered will not flower again, and the only value it has is in the offsets which it may have formed. These may be planted out, as before described, to produce new bulbs for the succeeding season.

The cultivation of the Tuberose as a *winter* flowering plant has been practiced in this country only within the past six or eight years, and as yet only in five or six establishments successfully. Many fail from the cause to which is due the failure of almost all floricultural operations —too great a variation of temperature required by the nature of the plant. Still the demand for flowers of such rare purity and fragrance is such that it will stimulate many others, doubtless, to exercise the necessary care in their culture and produce profitable results.

The variety mainly grown is the double one, *Polianthes tuberosa plena*, but the single variety is very useful for its earliness, blooming in the open ground two weeks sooner than the double variety. A new variety, known as "Pearl," of very dwarf habit and of flowers nearly double the size of this older sort, will doubtless soon be exclusively grown.

The Gladiolus may be forced in winter by the same methods as we recommend for the Tuberose.

CHAPTER XXII.

ORCHID CULTURE.

[The following brief detail of Orchid culture is written by James Fleming, Jersey City Heights, N. J. whose success in handling one of the largest and most valuable collections in the vicinity of New York well warrants him in giving instructions on the subject.]

It is only of late years that Orchids have been cultivated in this country, and it is even now rare to find a collection of more than a few dozen plants. This, no doubt, is from the idea entertained by many that they are very difficult to grow, but this is not by any means the case, as with favorable conditions they can be as easily grown as a Camellia or Azalea. As we begin to know more of their native habitats and the climate and conditions in which they grow, then we, no doubt, will find them more thoroughly distributed through the country, for the Orchidaceæ certainly embrace some of the most beautiful gems in the floral world. There are a few enthusiastic amateurs amongst us who deserve great credit for the trouble and expense they have incurred to enrich their collections and foster a taste for the cultivation of Orchids.

It is entirely unnecessary to have a separate house for Orchids, as they can be grown very well with a general collection of stove plants where a temperature is maintained at 60° to 80° or 90° in summer, and 55° to 70° in winter for the Indian varieties, and 50° to 75° in summer, and 45° to 60° in winter, for the South American ones. I could never see that a few degrees' difference either way did any injury to the plants, as long as the proper degree of moisture was maintained. The house ought to be shaded in summer.

As the cultivation of the Indian and South American Orchids is the same, the only difference being in the tem

perature, I will briefly state the mode of treatment whereby I have had the most success.

When a tyro in the culture of Epiphytal Orchids, I commenced by fastening the plants, as imported, upon blocks of wood and pieces of cork. While some did tolerably well, the greater part did not grow to my satisfaction. In our hot, dry weather it was almost impossible to keep up the proper degree of moisture and a free circulation of air. So I soon found that by placing them in perforated pots or baskets, I was enabled to keep the roots moist and give plenty of air; by this treatment the plants began to improve daily.

The best material I ever found for potting was a very fibrous kind of turf, found in a dry part of a fresh water swamp. It could be torn up in thin sheets or broken into blocks of any size. This, mixed with sphagnum, broken pots, and charcoal in lumps, is the best mixture I ever tried. The plant should be well raised above the level of the pot or basket, so that no water may lodge around its neck, and the mixture built so as to hold it firmly in its place; and to give a neat, fresh-like appearance, chop some green sphagnum up fine, and put a layer over the whole. Baskets and pots of various sizes and patterns may be used, square, octagonal, etc., as the fancy of the owner may dictate. The best material for the baskets is locust or red cedar, as they last long and are not apt to be attacked by insects.

In potting Terrestrial Orchids, place them a little below the level of the pot (the same as any ordinary plant, and not raised as for the Epiphytal ones,) in a compost of rough, turfy loam, leaf mould, sand, and broken pots, and subject them to the same temperature as the Epiphytal species.

Water and syringe early in the morning, so that the sun may soon dry the foliage.

When the growing season is over, gradually lower the temperature, and decrease the quantity of water; during the pe-

riod of rest use very little water, just enough to keep the pseudo-bulbs from shrivelling. The best period to rest Orchids is from November to March. This will apply to the majority of species, but there will always be some whose season of growth and bloom will come in those months; these, of course, must be kept watered and growing.

Very few insects infest Orchids, scale being the most troublesome, and the only cure I ever found was to wash the leaves and pseudo-bulbs well and frequently with whale oil soap.

The following is a list of a few of the most showy and easily cultivated kinds.

AERIAL OR EPIPHYTAL.

INDIAN.

Ærides crispum.
" Fieldingii.
" odoratum.
Angræcum bilobum.
Ansellia Africana.
Dendrobium chrysanthum.
" Devonianum.
" Farmerii.
" nobile.
" Pierardi.
" pulchellum.
Miltonia spectabilis.
Phalœnopsis amabilis.
" grandiflora.
" Schilleriana.
Saccolabium Blumei.
" curvifolium.
" guttatum.
Trichopilia suavis.
" tortilis.
Vanda cœrulea.
" suavis.
" tricolor.

SOUTH AMERICAN.

Cattleya citrina.
" crispa.
" intermedia.
" labiata.
" Mossiæ.
" Skinneri.
Chysis bractescens.
Epidendrum aurantiacum.
" vittelinum.
Gongora atropurpurea.
Lælia acuminata.
" albida.
" anceps.
" Perrinii.
" purpurascens.
" superbiens.
Lycaste Skinneri.
Odontoglossum grande.
" hastilabium.
Oncidium leucochilum.
" luridum.
" papilio.
Stanhopea Devoniensis.
" insignis.
" tigrina.
Zygopetalum Mackayi.
" maxillare.

TERRESTRIAL.

Bletia Tankervilliæ.
Calanthe veratrifolia.
" vestita.
Cypripedium barbatum.
" caudatum.
" insigne.
" Stonei.
Cypripedium villosum.
Peristeria elata.
Phaius albus.
" maculatus.
" Wallichii.
Uropedium Lindeni.

CHAPTER XXIII.

HOLLAND BULBS.

The Holland Bulbs, comprising the Hyacinth, Tulip, Crocus, Snowdrop, Jonquil, Narcissus, Iris, and Fritillaria, are all hardy in this section of the country, although it is always advantageous to cover them with three or four inches of short manure, refuse hops, or sawdust, as a protection from being too severely frozen, as this, in cold and heavy soils, may sometimes injure their flowering.

All Holland Bulbs prefer a rich *sandy* soil, in preference to one of heavy clay. They are usually imported annually, although, with the exception of the Hyacinth, they can all be grown and increased to advantage in our own climate.

The bulbs are usually planted in the open ground in October, Hyacinths at distances of 9 inches apart, Tulips, Narcissuses, and Jonquils at 6 inches, Crocuses and Snowdrops, to produce a good effect, at 3 inches. They are best grouped in beds of each sort by itself to show to advantage. As soon as their flowering is over in spring, Verbenas or other bedding plants should be placed in the beds, as the bulbs are not sufficiently ripened to lift before June or July. When the leaves by becoming withered indicate the ripening of the bulbs, they should be lifted,

dried, and stored in some cool but dry place, to be again planted in October. It is essential to lift up and dry all such bulbs, else they will grow meagerly the succeeding season. In Europe, Ranunculuses and Anemones are grown to great advantage, planted in the same manner as we plant Hyacinths and Tulips, but our winters are too severe for them, so that they are rarely seen in good condition, except when grown under the protection of a cold frame, and for this reason are but little cultivated.

Nearly all these bulbs also may be grown as pot plants, for the green-house or parlor, particularly the Hyacinth, and as the treatment of them all is nearly alike, we will briefly give it. For pot culture the best bulbs should always be selected; the soil used is about one part decomposed cow or horse manure, to two parts sandy loam, well mixed by riddling through a coarse sieve.

The pots used should be from 5 to 7 inches in diameter; the mould should be placed in them rather loosely to the rim, the bulb pressed down so that only about one-third of it remains above the top of the soil; the pot is then struck smartly on a bench so as to give the soil the proper degree of firmness, which will bring it down to an inch or so below the rim of the pot. Water freely, when potted, to still further settle the soil. The pots should now be placed in some situation where it is cool and dark, so as to encourage a strong development of roots before the bulb starts at the top; such a situation may be formed by covering the pots with four or five inches of sand in a cool cellar, under the stage of a green-house or in a cold vinery, still enveloping them in soil or sand. If none of these conveniences is at hand, the pots may be pitted in a trench in the open ground, covered over with soil, and sufficient litter placed above that to keep out the frost, so that they can be got at when wanted. Hyacinths thus treated will have made sufficient roots by the 1st of October to admit of their being placed in the light by the middle

or end of November; as they begin to grow, water should be freely given, so that the earth may be moistened to the bottom of the pot, for if stinted in water while growing, the flowers will be smaller and not brilliant in color

HYACINTHS IN GLASSES.

Dark-colored glasses are best, the roots being impatient of light. The bulb should be placed so as to barely touch the water. The glasses should be put in the dark until the roots reach the bottom, when they may be exposed to the light. The water should be changed once a week; care also must be taken that they are not exposed to frost, else the glasses might be broken and the roots to some extent injured. Single Hyacinths are better adapted for glasses than double ones.

The varieties of Hyacinth are as numerous as those of the Gladiolus, and it would be no help to the reader to specify them by their name; the colors embrace many shades of red, blue, yellow, and white, in both the single and double sorts.

TULIPS.

These, like the Hyacinth, have single and double varieties, but the single sorts are more extensively grown, being much handsomer than the double varieties. They are divided into three classes: *Bizzares*, having a yellow ground splashed with crimson or purple; *Rose*, variegated with crimson, pink, or scarlet; and *Byblomen*, marked with black, lilac, or purple. These classes are again divided into "flamed" and "feathered;" the flamed having a dark pointed spot, something like the flame of a candle, the feathered, a dark-colored edge round its petals, becoming lighter near the margin. The double varieties are *Duc Van Thol*, red and yellow; *Gold and Scarlet Pœony*, *Tournesol*, scarlet and yellow, *Purple Crown*, etc.

CHAPTER XXIV.

CAPE BULBS—VARIETIES AND CULTURE.

GLADIOLUS.

Foremost among all "Cape Bulbs" (so called from being natives of the Cape of Good Hope), stands the GLADIOLUS. Perhaps no plant that we have in cultivation has made such an advance under the hands of the hybridizer within the past dozen years as this. We can well remember the time when the species and varieties were confined to *G. cardinalis*, *G. communis*, *G. blandus*, *G. ramosus*, and *Natalenis*, (or *psittacinus*,) and also the advent of the then new hybrid *Gandavensis*, which may be said to be the forerunner of all the beautiful varieties we now possess. These varieties are now almost numberless, varying in every shade of their beautiful markings, which range through all degrees of scarlet, crimson, purple, carmine, rose, yellow, and violet, down to white. It is useless to indicate varieties by name, as the annual improvements being made will possibly cause those which rank as the best of to-day to appear of inferior merit in two years hence.

Gladioluses are of the easiest culture; in this district, planted out the first week in May, they will be in bloom in July, and by making successive plantings every two weeks to the middle of July they can be had in perfection until the first of November. Although they are not at all particular about soil, yet, if choice can be had, a sandy loam, peat, or a soil of decomposed leaves is better suited than a stiff clayey soil. In any soil the flowers will be larger and richer in color if the bed be well enriched with manure. All bulbs of the Gladiolus will flower if over three-quarters of an inch in diameter; but of course the larger will be likely to produce larger spikes of flowers.

They should be taken up as soon as the stems begin to wither in fall; but should the stalk of the late plantings be yet green, the bulbs should be left adhering to the stalk until dried, which will tend to ripen off the bulbs. They may be kept in winter under the stage of the green house in a frost-proof cellar or closet, or, in short, in any place where potatoes can be kept with safety.

AMARYLLIS.

Next to Gladiolus under this head may be named the Amaryllis. The bulbs may be planted in July, August, or September, (if in pots not less than eight inches in diameter), in rich, light soil. The flower spike will be developed in October or November. They are best grown in pots in this latitude, as they are liable to be injured by fall frosts if left to flower in the open border. The plants should be kept growing for some months after flowering, so as to develop the bulb for future flowering; but they should be dried off for some months previous to the time of planting. The species are:

A. Belladonna. (Belladonna Lily), pale pink.
A. aulica.—Flowers large, green and scarlet.
A. blanda.—Flowers immensely large; whitish.
A. purpurea.—(Vallota), dwarf, bright scarlet.
A. vittata.—Striped, rose and white.
A. formosissima.—(Jacobean Lily), rich crimson.

NERINE.

The following, with other species, are plants requiring treatment similar to the Amaryllis, and well vorthy of general cultivation:

Nerine undulata, (carmine).
N. curvifolia, (scarlet).
N. Sarniensis.—(Guernsey Lily) (crimson).

IXIAS.

A pretty genus of bulbs, of easy culture; their season of rest is the dry summer months. The bulbs should be planted eight or ten in a pot in October, and kept in a greenhouse or cold frame, where they will flower abundantly in February, March, or April, according to the variety. There are numerous species, of which we name a few of the most distinct.

I. cristata.—Rich shade of rose.
I. capitata.—White and blue.
I. conica.—Orange.
I. crocata.—Orange yellow.
I. maculata.—Spotted.
I. patens.—Purple.
I. viridiflora.—Green, yellow and black.

SPARAXIS.

A genus allied to Ixia, requiring similar treatment in every respect. We name six of the most distinct.

S. anemonæflora.—White.
S. bicolor.—Blue and yellow.
S. blanda.—Deep rose.
S. grandiflora.—Large purple.
S. tricolor.—Yellow, purple and crimson.
S. versicolor.—Purple and orange.

ANOMATHECA CRUENTA AND JUNCEA.

These, if planted in pots in January and February, and turned out in the open borders in May, will bloom abundantly during the early summer months.

ORNITHOGALUM AUREUM.

This species of Ornithogalum is orange and black, and, with many other species, may be treated like the preced-

ing. They are interesting and attractive plants, the colors being principally white, yellow, or orange, occasionally marked with brownish-black spots in the centre of the flower.

LACHENALIAS.

Lachenalia tricolor (yellow, red and green), *L. pendula* (yellow and red), *L. quadricolor* (yellow, red, purple, and green), with many other species of similar color, are pretty little bulbs, with flower stems rarely exceeding nine inches in height. They are to be potted in October or November, and kept in green-house temperature, and they will bloom from January to March.

OXALIS.

A varied and extensive genus, embracing annuals, bulbous and tuberous rooted plants, and even shrubs. The best known and most beautiful of the genus is *O. versicolor.* The flowers of this variety are beautiful in the extreme, combining white, yellow, rose and crimson. The bulbs, which are quite small, should be planted an inch apart, in pots six or seven inches in diameter, in September or October, in the soil previously named for all bulbs of this description. As soon as the bulbs have well started to grow, they should be freely watered, and in ordinary green-house temperature will flower profusely from December to April. *O. canescens* (purple), *O. cuneifolia* (white), *O. flava* (yellow), and *O. multiflora* (lilac), require similar treatment. The summer flowering or bedding varieties, of which there is a large number, should be kept dry in winter and planted out in May, and they will bloom in profusion during the summer and fall months; of this class we name *O. Bowiei* (crimson), *O. carnosa* (yellow), *O. crispa* (white), *O. floribunda* (rose), *O. glabra* (purple), and *O. hirta* (lilac).

BABIANA.

A genus somewhat resembling the Ixias in the form of

the flower, but having in most of the species downy leaves; the treatment in all respects is similar to Ixias or Sparaxis. The species are numerous. The following six are named as types: *B. bicolor* (blue and white), *B. rubrocyanea* (blue and crimson), *B. spathacea* (light blue), *B. sulphurea* (yellow), *B. tubata* (red and yellow), *B. Thunbergii* (white and red).

HÆMANTHUS.

A genus allied to the Amaryllis, with bulbs of immense size, producing flowers of all shades from white to crimson, but rather coarse in outline. Culture same as for the Amaryllis.

TIGRIDIA, OR TIGER FLOWER.

This is not a "Cape Bulb," being a native of Mexico, but as it resembles in its habits many of that class we place it here. Like the Gladiolus, successive plantings every two weeks from May to July will give a continuous bloom during the summer months until cut off by frost in autumn. Its treatment in other respects may be that of the Gladiolus, only that greater care is necessary in keeping the bulbs in winter. After being dried, put them in some dry place, not too hot, where they will not freeze.

The Tiger Flower is one of the most beautiful of all bulbs, and although it has been in cultivation for nearly three-quarters of a century, has never been so generally grown as it deserves to be, probably from the difficulty of keeping the bulbs in winter.

Its gaudy, tulip-like flowers are yellow, spotted with crimson, orange, spotted violet red, and varying shades of these colors in the different sorts,

Tigridia conchiflora.
Tigridia lutea.
Tigridia pavonia.
Tigridia violacea.

CHAPTER XXV.

CULTURE OF WINTER FLOWERING PLANTS.

The demand for flowers in winter has steadily kept pace with the supply, even in the city of New York, where perhaps half a million of dollars has been invested in stock and in green-houses for that special purpose within the past five years. Perhaps no place surpasses, if it equals this, in the extent of its flower business or in the systematic manner in which it is carried on. The variety of plants used for this purpose is not so extensive as might be supposed; the following, comprising the leading sorts, are named in the order of their value and importance for cut flowers.

1st. Camellias, Carnations, Violets; 2nd. Roses, Tuberoses, Double Primroses; 3rd. Bouvardias, Stevias, Eupatoriums; 4th. Heliotropes, Poinsettia pulcherrima, Euphorbia jacquiniflora; 5th. Stock Gillies, Begonia Sandersonii and others, Fuchsia speciosa; 6th. Jessamines, Balsams, Bignonias of all sorts; 7th. Hyacinths, Mignonette, Sweet Alyssum; 8th. Azaleas, Heaths and Ageratum.

We will give descriptions of the manner of growing the plants above enumerated, which will be more or less extended as the importance of the variety seems to require.

CAMELLIAS.

Camellias are the most important of all flowers used in the construction of baskets or bouquets, and hence are placed first on the list. They are now grown to an extent truly surprising for that purpose in all our large cities and their surrounding neighborhoods. Philadelphia, until recently, was the great Camellia mart, but of late years two or three establishments in the vicinity of New York are making such rapid strides that the Philadelphia florists cannot long compete with those of New York.

The advance of the New York establishments is due, without doubt, to their more rapid manner of propagation. While the Philadelphia florist contents himself with the slow but sure practice of inarching, the New York Camellia-grower is making nearly a dozen plants to his one, by the method, equally safe to him, of grafting.

The process of inarching the Camellia, or grafting by approach, is usually performed in July, by slicing off a thin portion of the stock and a corresponding portion of the variety to be inarched. The slice pared off should be deep enough to take a portion of the wood off with the bark, and of about two inches in length; the parts should be so joined that at least one side shall closely meet, and there be tied moderately firm, to keep them in place until they have grown together.

If done in July, the part inarched may be cut from the parent stem in October.

Grafting the Camellia, in our opinion, is just as much an improvement over inarching as growing a grape-vine or rose from a cutting is over the ungardener-like practice of growing it from layers. I am aware that in many hands the grafting of the Camellia has proved a failure, not so much due to anything wrong in the way the mechanical part of the operation was performed as to the wrong time it was done. The best time in our climate to graft the Camellia is from the 15th of August to the 15th of September; at such times the sap is in just the right condition to form the proper callosity to cause an adherence of the parts. Figure 51 shows the operation, which is of the simplest kind; the main point to be looked to being the accurate junction of the parts, at one side at least, and careful tying up, to keep the graft in place. After the operation, the next point of importance is the place in which the plants are put. It will be understood that the graft is in some respects analogous to a cutting, being a detached part of a plant with nothing to support it as yet, and that the same

points to be observed in the rooting of a cutting must be attended to in the graft; hence we place them in a position where they will be safe from a high temperature and a dry atmosphere, which would be as quickly fatal to the graft as to the cutting. The best place, then, for Camellias in process of grafting is in a shaded frame or green-house, where the lowest temperature possible at that season can

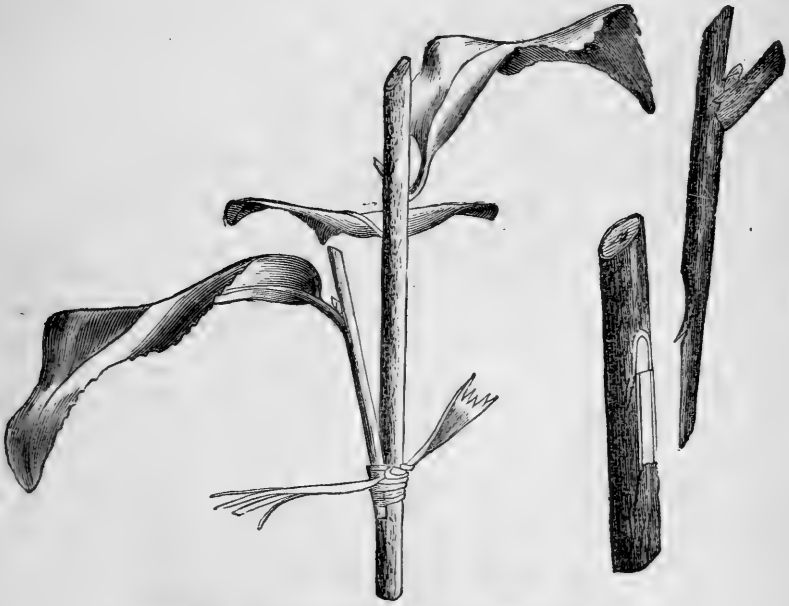


Fig. 51.—GRAFTING THE CAMELLIA.

be kept without allowing a current of air to play directly on the plants. Where the operation is done extensively, a frame is made inside the green-house in which the plants are placed for the purpose of avoiding currents of air.

It is quite a nice point to regulate the due proportion of water; as the stock is partially cut down, with but few leaves left to elaborate the sap, it follows that only as much water should be given as will keep the plants from becoming too dry; for this reason, if there is danger to be apprehended from rain or other sources of moisture, the

pots are laid on their sides, to prevent the soil from getting excessively wet.

The stocks on which the Camellia is inarched or grafted are raised from cuttings of the single or strong-growing double varieties. Many of the double sorts make as good plants raised from cuttings as by being grafted. This is not the case with the double white, which is the most valuable of all for winter flowers. The cuttings are made from the ripened young wood, and are treated in the usual way, (See chapter on Propagation.)

The Camellia is not at all particular as regards soil, and may be seen luxuriating in those of very different characters. The great points are a humid atmosphere, a temperature in winter not exceeding 50°, in summer weather keeping them out of doors or in the green-house, and partial protection from the full rays of the sun.

Large numbers are now being planted out in green-houses specially erected for the purpose; in this way they grow with great luxuriance, and the flowers are usually finer than when grown in pots. Caution must be used not to stimulate a second growth in summer by undue watering, else they may make another growth to the destruction of the flower buds. The Camellia cannot safely be "forced" to produce early flowers by applying heat in fall or winter, but to have flowers early the forcing must be done in spring, while the plants are making their growth; at this time they will stand a temperature of 60 or 65 degrees at night with safety. Kept warm at this season, the buds set early, and produce early flowers in fall and winter. By thus forcing in spring for two seasons, the greater part of the crop of Camellia flowers will be obtained by the holidays, at which season they are most valued.

Of the varieties used for cut flowers the whites are those prized most; of these we have Double White and Fimbriata as the early sorts, and Candidissima as the late.

Of the other white sorts, none flower abundantly enough to make them profitable, except Lady Hume, which, however, is tinged with blush. It is somewhat singular that though the Camellia has been extensively cultivated for thirty years, we have no white varieties originating in all that time that have equalled these four sorts in their peculiar qualities. Of colored sorts we have some hundreds; prominent among them and of different styles of marking and color, are Imbricata, crimson and white, Landrethii, bright rose; Benneyii, crimson striped white; Wilderii, scarlet crimson; Sacco Nora, pink marbled rose; Downing, deep carmine blotched white; Duchess of Orleans, striped pink and white; Conspersa, carmine striped; Reine des Fleurs, dark crimson.

In market the value of the flowers and even plants of the white sorts is double that of the colored. The average wholesale price of White Camellia flowers in New York from December to April may be $15 per 100; colored sorts do not bring half that price, and are in little demand.

CARNATIONS.

In the first edition we named the Carnation as next in value to the Camellia as a winter-flowering plant, but since then the Rose has become the leading flower, even surpassing the Camellia in popularity. The Carnation is still grown by us in very large quantities.

The cultivation of the Carnation is very simple. It is rooted from cuttings at any time from October to April, and as the plant is almost hardy, it may be planted out with safety in the open ground in early spring as soon as cabbage, lettuce, or any other plant of that nature. Many, for want of this knowledge, keep Carnations in the greenhouse or pits until such time as tender plants are set out in May, thereby not only having the useless trouble of taking care of them, but depriving them of six weeks of a season well adapted to their growth.

They are best planted out in beds of six rows, nine inches apart, and the same distance between the plants, with eighteen-inch alleys between the beds. The Carnation is very impatient of a wet soil, and care should be taken that the land be made dry by draining or otherwise. As the Carnations grow they throw up flower shoots, which must be cut off all through the season, until about the 1st or 15th of September. If the plants are wanted for winter flowering, this cutting back of the flower shoots induces a dwarf and stocky growth, which is very desirable in the Carnation. If they are grown in large quantities for winter flowering, by far the best way is to plant them on the benches of the green-house, at about the same distance as they were growing outside, any time in October; but if only a few are required, to mix in with a general collection of plants, it is more convenient to grow them in pots, so that they may be moved about as may be necessary. Of the varieties grown, though we have some hundreds, as in the case of Roses, we have only a few suited for winter flowering. Of these, so far, the most productive is La Purité, a deep carmine variety; next, a *variegated variety* of the preceding. Among whites, Maimie and Degraw take the lead. In yellows, we have Astoria and De Fontana, but these fall far short of the others in productiveness of flowers.

The flowers of La Purité and other colored sorts sell in New York at $2 per 100, the whites usually at $3 per 100. Even at these low prices they are a fairly profitable crop, as the bulk of the flowers is given previous to the middle of January, when the forced plants, being of but little use, are usually thrown out to make room for other plants. Although the Carnation is nearly a hardy plant and may be kept anywhere in winter in a cold green-house or pit, even if occasionally slightly frozen, yet it is also susceptible of being forced freely. We usually keep our houses, when we are forcing for flowers, at from 50° to 60° at night.

VIOLETS.

The demand for Violet flowers during the winter months in all our large cities is yearly increasing in a wonderful degree. For the New York market alone it is estimated that two acres, or nearly 100,000 square feet, of glass is now used for growing Violets alone; some growers make it an exclusive business and grow nothing else. It is not always a success with every one attempting it; hence the price has kept steadily up to the highest rates of past years. To those who are successful, the business is always a profitable one. The following brief but practical notes are from Messrs. Norton Bros., of Dorchester, Mass., who have been among the most successful of any in the trade in forcing Violets during the winter months.

"The variety used is the double blue Neapolitan. We separate the plants to one good crown, with roots, and plant out in the open ground about the 20th of April, at distances of about one foot each way. Nothing is done to them until the first week in September, except to keep them well hoed and clear of weeds. They are then thinned out to six or eight crowns, selecting such as are the strongest and taking off all the runners and weak shoots, the principle being exactly the same as in preparing good stools of strawberries for fruit. About the last week in September the plants are dug up with balls and planted on the shelves of the green-house in six or eight inches of well-enriched, fresh loam.

Shading and watering are necessary if the weather is clear and dry, and, until the end of October, air should be given freely. The temperature at night should average not more than 50 degrees. As the plants begin to grow, all yellow leaves, weeds, and runners, should be carefully removed, so as to admit air and light to the flowers. From a green-house 75 feet long with a table or

bench room of 8 feet wide, we sold last year our crop of Violets in Boston at the following rates:

October	averaged	$4.25	per day, price,	75c.	per 100.
November	"	4.75	"	$1.00	"
December	"	5.25	"	1.25	"
January	"	6.00	"	1.25	"
February	"	8.75	"	1.25	"
March	"	10.25	"	1.00	"

The aggregate for six months exceeding $1,000."

This was a most excellent result, and the crop would

Fig 52.—KING OF VIOLETS.

have paid well at half these rates, which, however, are quite double those of New York. Besides, it will be ob-

served that the date only extended to March, after which the glass, no doubt, was employed nearly equally well by Messrs. Norton in the growing of bedding plants, to meet their sales of such articles in May.

There are quite a number of varieties of sweet Violets, but the double blue Neapolitan thus far seems the one most suitable for forcing. The other varieties we name in the order of their merit.

Marie Louise.—Double blue, much darker and larger than the Double Neapolitan, equally fragrant and abundant in blooming. It flowers somewhat earlier in the fall, and is rather more impatient of artificial heat. In cold frames, kept so that they do not freeze, it gives abundance of bloom until the holidays.

Schoenbrun.—Single blue, very prolific.

King of Violets.—Very large double blue flowers, one inch in diameter.

Queen of Violets.—Blush white, very double.

Double White Neapolitan.—Double white.

ROSES.

Our system of forcing Roses for winter will be found in the chapter on Rose culture. We will merely refer to the prices paid and the relative value of the Rose as a profitable plant for that purpose. The price ranges from $3 per 100 buds in November until Christmas, at which date, and until the holidays are past they average $8 per 100, but again fall off to $4 or $5, at which rates they continue until May or June. It will be understood that these are the wholesale rates; at retail they bring nearly treble.

TUBEROSES.

The methods of forcing will be found fully detailed in the chapter on the Tuberose, and we will merely say here that in our own experience the Tuberose, as a plant to force for winter sale, has proved one of the most profitable of all

that we have tried for that purpose. The crop, even at what may be termed the low rate of $4 per 100 florets, has netted us $1,000 for one of our 11x100 feet structures, and that, too, during December, from dry roots planted in August.

DOUBLE WHITE CHINESE PRIMROSE.

This ranks high as a winter flowering plant, being productive in a wonderful degree, as many as a thousand florets often being picked from one plant. It is of easy culture during the fall, winter, and spring months, but requires careful handling during summer. We find it thrives best in summer in a cool green-house, having the sashes lightly painted with whitewash,—say from June 1st to November 1st; but as fall advances, the whitewash should be partially rubbed off, to accomodate the lessened force of the sun's rays at that season. By the 1st of November it should be all cleaned off. It is always grown in pots of a size to correspond to the size or degree of vigor of the plant. The soil used contains about one half part leaf mould or decayed refuse hops. It being a very fine rooted plant it requires the mechanical condition to be soft and easily penetrated by its thread-like roots. It may be grown in a temperature varying at night from 50 to 60 degrees. It is usually propagated by dividing the roots, though this is but a slow way of increase, and by no means so well fitted to make healthy plants, as by making cuttings of the side shoots in the usual way. Cuttings taken off in March will root in four weeks, and by fall, with ordinary care, make plants large enough to produce an average of 500 florets during the winter.

The average price for the winter is fifty cents per 100 florets. There are now some four or five double colored varieties, with colors ranging from light rose to crimson; they are yet, however, quite scarce here. Their culture and propagation are identical with that of the double white.

BOUVARDIAS.

Bouvardias are grown in immense quantities, occupying an area nearly as large as that of the monthly Carnations in our green-houses. They are mainly propagated by pieces of the roots (see Propagation) in April, and when these have thrown up a growth of 2 or 3 inches they are potted in two-inch pots and planted out in the open ground at a distance of 9 or 10 inches apart, in the latter part of May. Some of the varieties, such as Hendersonii and Wilsonii, being "sports," that is, what Darwin calls "bud variations," seem to have the variation in the shoots and flowers only, and not extending to the roots; hence in the case of Hendersonii, which is a sport from the Carmine variety Hogarth, but with almost white flowers, if we propagate it from pieces of the root the flowers will be of the carmine color of the original Hogarth.

In such cases, to perpetuate these rare and valuable varieties, recourse must be had to propagation by cuttings, which is best done, however, from June to September, as the Bouvardia, being a hot-house plant, grows and develops roots most freely in a high temperature. The plants that have been put out in the open ground in May will have grown to a fine, bushy form by September 1st, if due attention has been given to nipping off the tops every two weeks during summer. By this date they should be taken up and potted; if possible, they should be lifted with balls of earth adhering to the roots, as they wilt very easily, and the plants require great care in lifting. In any case, it is necessary to shade and freely water for six or seven days before exposing them to full sun. They had better be stood in the open ground or in a cold frame, after being potted, rather than put in a green-house, as it is very necessary that they be fully exposed to light and air for as long a time as possible, before placing them in their winter quarters in the green-house. They should be put

into the green-house, or some place where they can be sheltered by sashes, before there is danger to be apprehended from frost, as the Bouvardia is a very tender plant, and will be injured by a very slight degree of frost. They

Fig. 53.—BOUVARDIA HENDERSONII.

may either be grown in pots, or planted out from the pots on to the benches, as we do with Carnations and many other things. Our own practice, as we have before said, is to set all such plants out in the benches, as the flowers

produced are much finer, owing to their having a more regular condition of moisture at the roots; besides, this gives a greater area for the roots to run in. We have said the Bouvardia is a hot-house plant; therefore if flowers are wanted in the early part of winter, the temperature at night should range from 55 to 60 degrees. The leading varieties of Bouvardia are,

Hogarth.—Deep carmine.

" **Hendersonii.**—French white. Figure 53.

Leiantha.—Scarlet, yellow anthers.

" **floribunda.**—Orange scarlet.

" **grandiflora.**—Flame color, very large.

" **splendens.**—Crimson scarlet.

Jasminoides.—Pure white.

Davidsoni.—Pure white, most valuable.

Nothing that is grown is more productive of flowers, and a house filled with the different varieties in full bloom has a dazzling effect.

The price paid by the trade averages about $1.50 per 100 trusses.

STEVIAS AND EUPATORIUMS.

Stevias and Eupatoriums are used for winter, and are white-flowering plants, of no particular beauty in themselves, but admirably adapted from their feathery-like sprays, for mixing in with bright-colored flowers. They are of easy propagation, and being of rampant growth, had better always be grown in pots throughout the summer—plunging the pots to the rim in the usual way, to save watering. They can all be grown to flower in a low green-house temperature, and as many of them bloom rather early in the winter, every expedient is used to keep them as cold as possible, without freezing.

Stevia compacta flowers during November.

Stevia serrata flowers in December.

Eupatorium arboreum flowers from November to January, by retarding portions in cold frames.

Eupatorium salicifolium flowers throughout January;

Eupatorium elegans from February to March.

The flowers rate at about the same price as Bouvardia

HELIOTROPES.

The manner of growing the Heliotrope for winter flowers is nearly identical with that of the Stevia or Eupatorium, during the summer months; only, like the Bouvardia, it requires heat to bring the flowers out in profusion in winter. The varieties best adapted for forcing are:

Jane Mesmer,	**Oculata,**
Boule de Neige,	**Surprise,**
The Standard.	**Elegantissima.**

The Heliotrope flowers without intermission during the entire season, if kept growing.

Value about the same as the Bouvardia.

POINSETTIA PULCHERRIMA.

The Poinsettia pulcherrima is grown from cuttings of the green or of the ripened wood in April or May, and shifted as required during the summer, plunging the pots in beds in the open ground. It must be placed in winter quarters before the weather has become cold enough to chill it, as it is a tender tropical plant, and requires a hot-house temperature of not less than 60° for its full development.

Grown in this heat, it is a plant of the most gorgeous beauty, the bracts or leaves surrounding the flower averaging, on well-grown plants, one foot in diameter; grown as a hot-house plant, it is in full perfection at the holidays, and is now largely used for decoration. Many thousand heads are sold in New York annually, at an average of $25 per 100.

Euphorbia jaquiniflora and splendens are plants of the same family as Poinsettia and require similar treatment in all respects. The former, from its style of growth, is much used for wreathing, but neither of them are as yet extensively grown.

BEGONIAS—OF SORTS.

The Begonias cultivated for winter blooming have drooping Fuchsia-like flowers of different shades from white to scarlet, and are used to a considerable extent as a "fringe flower" for sides of baskets and vases. Sandersonii and Fuchsioides are the best, having bright scarlet flowers produced in great abundunce, Carnea, a rich pink, and Marmorata, a flesh-colored sort, are also desirable.

FUCHSIAS.

There are but few varieties of Fuchsias adapted for continuous blooming in winter, but these are very desirable, and whether grown as ornamental specimens for the conservatory or for cutting for flowers, they are much valued.

The best three in our experience are F. bianca marginata, a white-sepaled variety with crimson corolla; F. speciosa, flesh-colored sepals with scarlet corolla; and F. serratifolia, greenish sepals with bright orange scarlet corolla. This last is of a particularly bright and unique color, differing entirely from all other Fuchsias. Two-year-old plants bloom in the greatest profusion, plants one foot in diameter giving upwards of 100 flowers, which are much esteemed for their rare color.

JASMINUM GRANDIFLORUM.

This is grown to the best advantage by permanent planting out in the green-house, and training to a rafter or trel-

lis. Its pure white flowers and delicious fragrance make it much prized at all seasons.

DOUBLE BALSAMS.

If sown in August and potted into 6 or 7-inch pots, in light, warm hot-houses, these will flower until the holidays.

BIGNONIA VENUSTA AND JASMINOIDES.

These are green-house climbers, which only do well as permanent rafter plants, usually not flowering until they are two or three years old; by that time, however, they usually cover the rafters to a length of 20 or 30 feet. B. venusta is bright orange; B. jasminoides is purple and white, and its flowers are formed in immense clusters and are extensively used during winter. The colors of both, although entirely different, are also unlike our usual colors of flowers.

HYACINTHS.

Hyacinths are used quite extensively in the late winter months, but are not generally obtainable in good condition before February, as, to give them justice, they require to be kept a considerable time at a rather low temperature to form their roots. Potted in September or October and plunged so as to exclude the bulb from the light—in a cellar or under the stage of the green-house, or any similar place—they will form roots in abundance in six or eight weeks, when they may be removed and placed on the stage of the green-house to flower.

MIGNONETTE AND SWEET ALYSSUM.

Sown in August in a cold frame and thinned out so that the plants will stand 6 or 8 inches apart, and left without the covering of the sash until frost is expected in September or October, these will flower abundantly until

January, if covered up by sash and mats so as to exclude the frost, or they may be sown in August or September and grown in pots and flowered in a cold green-house during the winter months.

AZALEAS.

These are grown to a considerable extent as specimen green-house plants, propagated from the young wood in March; potted and planted out in the open ground in May they make fine plants by fall, but most of the varieties do not bloom freely until the second year. The Azalea is a plant having very fine roots, and consequently requires a soil composed largely of leaf mould or peat to grow to the best advantage. There are now several hundred sorts, many of them of great beauty. They are not considered a suitable plant for bouquets, being too loose and flimsy in texture, but are used to some extent in baskets and vases of flowers, particularly the compact and white flowering varieties.

HEATHS.

A few of the free-growing winter flowering varieties of Heaths are well fitted for bouquets; of these *Erica gracilis* (carmine,) *E. persaluta-alba*, *E. vernalis* (pink,) and *E. actæa* (white) are the best. They are best grown from cuttings of the young wood in March, and if planted out in the open ground in May, in light, sandy loam, will make plants of a size large enough to flower in winter. They are not extensively used however, being less profitable than many other things. The Heath is justly considered as one of the finest of all hard-wooded green-house plants in Europe, but most of the varieties are very difficult to grow in our hot summers, so that all those who have attempted to imitate the splendid specimens seen in the Botanic Gardens of Edinburgh or Dublin, or at the Crystal Palace of London, have completely failed.

PLANTS USED FOR FOLIAGE.

In the formation of cut flowers into bouquets, etc., the leaves form an indispensable part. In trimming the edges of baskets, Camellia leaves are much used, also Cissus discolor, a climbing hot-house plant, with brownish-crimson leaves splashed with white; it requires a temperature of at least 60 degrees in winter, and never develops its rich coloring unless at a high temperature. Another most graceful plant, now very extensively used for its foliage, is *Myrsiphyllum asparagoides* (Smilax); it is unsurpassed for all kinds of floral decorations, whether for the person or in adding grace to floral ornaments for the table or room. Its leaves, or what passes for leaves, are small and shiny and attached to very delicate wavy stems, and have the quality of retaining their firmness for a long time without wilting. The plant is raised from the seed, or the roots may be purchased from dealers. The root consists of a cluster of fleshy tubers which throw out several slender stems, which, if furnished with supports, will climb to the height of 20 feet. Near our large cities houses are devoted exclusively to the cultivation of "Smilax"—the roots being planted in boxes upon the ground and the stems trained by strings up to the rafters. Rose, Lemon, and Apple-scented Geraniums are used with flowers in making up bouquets.

LILY OF THE VALLEY.

Fashion rules in flowers the same as in all other matters of ornamentation, and for the past two seasons—1872 and 1873—flowers of the Lily of the Valley have been in demand at higher rates in proportion to their size than any other cultivated flower, single spikes of flowers bringing from $10 to $15 per 100. The roots are mostly imported from Europe, the single crowns or eyes costing about $25 per 1000. The demand for them has been so great that the quality of roots sent us has been very in-

ferior, so that the attempt to flower them has completely failed in more than half the number of instances tried.

The method is to place the crowns thickly together in shallow boxes, and keep them cool for 4 or 5 weeks after planting, or until they have formed roots. The temperature is then gradually increased until it reaches 65 or 70 degrees. The glass should be well shaded. The plant being a native of shady woods, the nearer we can imitate nature the better will be our success in cultivation. Some who force this keep the plants entirely in the dark until the leaf and flower-spikes are well developed.

JAPANESE CHRYSANTHEMUM.

Chrysanthemum laciniatum, the Japanese Fringe Flower, which is comparatively new to our collections, it having been introduced with several others in 1865. As a Chrysanthemum merely, there is nothing remarkable about it, except the fringed edging to the petals; but last year its winter-flowering qualities were discovered by one of the leading flower-growers for the New York market; its blooming so late gives it great value for florists' purposes. The flowers are double, nearly three inches in diameter, delicately fringed, and of the purest white. It is this season largely grown for winter bouquets, etc., by most of our florists.

CHAPTER XXVI.

CONSTRUCTION OF BOUQUETS, BASKETS, &c., &c.

The following chapter on making up flowers into bouquets, etc., and descriptive of the various styles now in use in New York and vicinity, has been written by James H. Park, of Brooklyn, L. I. Mr. Park's taste and judge-

ment in this business have given him an enviable reputation, and my readers, many of whom are deeply interested on this subject, will, I am certain, heartily join with me in thanking him for his clear, comprehensive, and unreserved account.

CONSTRUCTION OF BOUQUETS, BASKETS, ETC.

With the earliest civilization of our race, flowers began to be cherished, and employed for decorative purposes; nor is their arrangement in bouquets a modern art, although its practice is of comparatively recent and marvellous growth amongst us.

Many people decry the artificial arrangement of flowers, but how shall we otherwise use them to advantage? The moment we begin to tie them together we leave nature, and ought to do so only to study art. In their simplest arrangement, form and color must be studied to produce the best effect, and whoever best accomplishes this, will surely succeed in displaying his flowers to the best advantage.

Bouquet making is (or at least ought to be) *the art of arranging flowers.* Who has not seen bunches of beautiful flowers cut from the garden and tied up in the least artistic fashion with the most stupid result? And who that has attended fashionable weddings or parties has not occasionally seen a large bouquet or basket in which the *quantity* of good flowers was its only merit, where a mass of flowers were muddled together in a most incongruous fashion, equally removed from both nature and art? Nor is this fault that of the tyro in bouquet making only; many who practice it as an occupation have not learned the first principles of tasteful arrangement. Yet great allowance may be made for the bouquet makers, when we consider how much like labor their work becomes. Any one, trying always to execute this work with taste, would scarcely

accomplish the amount of work required of him in any thriving establishment, a great part of which is of necessity done hurriedly; and as the variety of flowers is so great and constantly changing with the seasons, and their colors so varied, it is only by trying them in various combinations that the best results can be obtained. Few are willing to pay for this kind of work. Many a gardener, who is not too well occupied in winter, might make a pleasing study of this little art, and thereby add to his own pleasure and profit, as well as those of his employers.

Probably the simplest, easiest, and commonly the most desirable, method of using cut flowers is arranging them in vases. The more loosely and unconfused, the better. Crowding is particularly to be avoided, and to accomplish this readily a good base of greens is required, to keep the flowers apart. This filling up is a very important part in all bouquet making, and the neglect of it is the greatest stumbling-block of the uninitiated. Spiked and drooping flowers, with branches and sprays of delicate green, are indispensable to the grace and beauty of a vase bouquet. To preserve the individuality of flowers, which is of the greatest importance, the placing those of similar size and form together ought to be avoided. Thus Heliotrope, Stevia, Eupatorium, or Alyssum, when combined lose their distinctive beauty; but, if placed in juxtaposition to larger flowers, and those of other forms, their beauty is heightened by contrast. It may be stated as a rule, that small flowers should never be massed together. Large flowers with green leaves or branches may be used to advantage alone, but a judicious contrast of forms is most effective.

Nothing is so strikingly beautiful on a refreshment table as a handsome centre-piece of flowers. All the airy castles of the confectioner are passed over by the eye, which is at once arrested and refreshed by the brilliant

beauty of the products of the garden or conservatory; and we wonder how any person of taste, who possesses the means, should ever fail to have flowers on his table when entertaining friends. Considering the effect, flowers on the table, like plants in the garden, are certainly the cheapest of ornaments. There are those who would have nothing upon their table but what they can eat or drink; like a gentleman who once employed the writer of this to lay out a new garden, and objected to having roses planted by the fences, saying very earnestly "Ah, yes! I suppose they are very pretty, but then, you see, we couldn't get anything to eat from them. Guess we won't have any of them things." Luckily for the well-being of poor humanity such desperately practical men are not very numerous. An épergne filled with flowers forms the most effective of table bouquets. For a large dinner table this bouquet holder ought to be from two to three feet in height, with three, four, or five branches, and if the table is very large, a smaller épergne at each end will add to the effect. For a less pretentious table an épergne twelve to eighteen inches in height may be used to equal advantage. The superiority of an épergne consists in its raising the flowers to a height sufficient to gain their full effect, whereas forms of flowers built from a lower vase lose much by the interference of surrounding dishes. With a handsome épergne and the flowers arranged in nearly semicircular outline, pointed with two or more handsome flower-spikes, and diversified with here and there a fine fern leaf and other sprays of lively green, with a few fine rose-buds and spikelets of heath, acacia, or similarly formed flowers, projecting from the main body to give ease and grace, and with a profusion of bright green or variegated foliage and flowers in drooping sprays around, the best results may be attained. For such a bouquet a fair proportion of large flowers is indispensable, and an excess of projecting points is to be avoided as confusing. Table

bouquets, made in the fashion of the confectioner's stiff pyramids of maccaronies, are wretched decorations, and very discreditable to all connected with them Better, a thousand times, to have half the quantity of flowers decently arranged.

Baskets of flowers for decorating parlor tables, mantels, &c., ought to be somewhat in keeping with their surroundings; a rough bouquet, adapted to grace a rustic table at a picnic, would not be in as good taste here as something finer and more neatly put together. Oval and round are the only permissible forms for flower

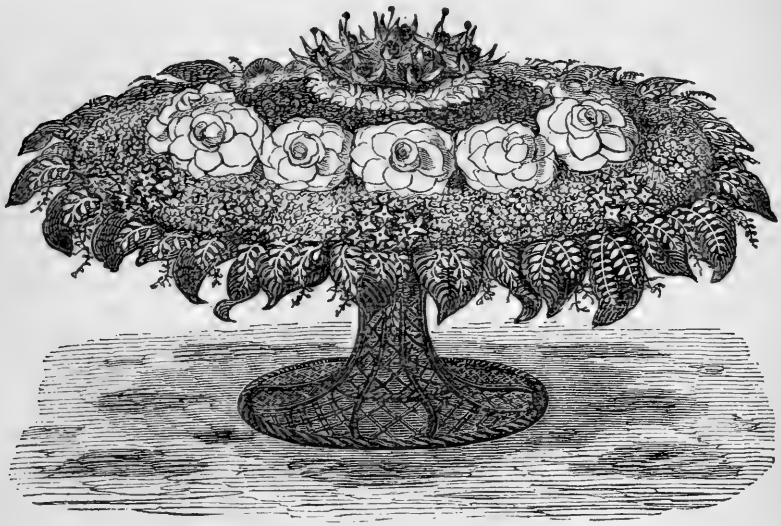


Fig. 54.—BASKET OF FLOWERS.

baskets; the flowers ought also to be rounding in form, yet not too much so. We give an illustration, (fig. 54,) as the easiest method of conveying our idea of the best outline. The basket shown here is also one of the best, but whether high or low, the open round or oval basket is very effective. Handled baskets we deem out of place as parlor ornaments, having doubtless been originally designed to carry; the handle invariably interferes with the general effect, and can only be tolerated

when beautifully trimmed with flowers and fine greens. For parlor decoration, high stands, with or without branches, small, pendent baskets, or hanging baskets of flowers, or of plants with rich flower sprays hung around them, are frequently used to advantage. Balls of flowers, like hanging baskets, are best displayed from the centre of an arch or folding doors, and with festoons of flowers looped from centre to sides the effect is greatly heightened. Festoons of green suspended chain-like from the top of a plain chandelier to each light, with festoons of flowers from the centre underneath to the same points,

Fig. 55.—HAND-BOUQUET.

make one of the gayest of floral decorations. Wreaths of flowers or of bright green leaves, or of both, around circular or oval framed portraits may be used on special occasions to advantage. A ball, or hanging bouquet, loosely arranged, suspended clear, in front of a high mirror, and with rich festoons of flowers, from the same, point looped to each side, makes a splendid display.

The circle must be taken as the line of beauty in all bouquet making, apart from those loosely arranged. Whether it is a table or hand bouquet, or basket, there

must be a certain rounding of outlines, the segment of a circle. Hand bouqets admit of the most formal arrangement of flowers, and the tendency of all cultivated tastes in this direction must be admitted as proof, that for this purpose something more than a mere bunch of flowers is required. The American, French, or English lady never figures, even in a book of fashion, in evening dress, holding a bunch of flowers or any odd shaped bouquet. Crude forms, pyramids, balls, &c., can never supersede the slightly rounding bouquet, (fig. 55,) which is likely to continue for all time the true form, like the parasol, which might have been its prototype. Ball bouquets would be handsome enough, but for the handles, which completely destroy the line of beauty. As for those abortions of the same form pointed with rose-buds, they are only fitted to convey to moderns an idea of the ancient weapon of war, that was swung by a chain or thong, and which Sir Walter Scott describes the Baron of Smailholm as carrying:

"At his saddle girth hung a good steel *sperthe*
Full ten pounds weight and more."

After form, the most important point in bouquet making is the arrangement of colors. The incongruous mixing of these in a great measure destroys the effect of the finest flowers, while the more delicately the coloring is blended and the more strikingly contrasted, the more perfect and pleasing is the result. Let any one who doubts this, compare a bouquet of the best flowers in which many colors are freely used, with one made of pink shading delicately from the centre to blush and white, or *vice versa*, and with a few tiny points of bright scarlet or violet tastefully set amidst the white.

The arrangement of colors in simple geometrical forms is greatly preferable to a succession of distinct rings in a bouquet. The ribbon pattern is very pretty in a flower bed, but in very questionable taste in bouquet making;

a bordering of white, blue, or pink, may be generally used with good effect. Handsome leaves of the geranium or camellia (the latter is preferable for its brightness and durability) alternating with fine sprays of green, delicate flower scapes, or spikelets of heaths, form a fitting edging for a hand bouquet. A fine hand bouquet may be made with smooth outline and relieved by a few delicate points of green or fine leaves. In filling out a hand bouquet, half-dried moss is preferable to bouquet green, as it can be used more readily to keep the flowers apart without so much increase of weight and stem; a light backing of green, concave underneath, finishes the bouquet. White lute-string ribbon wound around the handle and tied in a bow is preferable to tinfoil.

Judging the merits of bouquets, etc., has always been a very difficult point amongst gardeners and florists, nor is this to be wondered at when exhibitors and judges have each their own notions of excellence, various as the men themselves. It is only by comparison that the merits of any article can be well judged, and the best connoisseurs of arranged flowers are not to be found amongst gardeners, who have few opportunities of comparing such things, but amongst the lovers of flowers, the men and women of cultivated tastes who, having leisure and means, find pleasure in studying their merits, and thus set up for themselves a higher standard of excellence. An unskilled person set to judge a collection of pansy flowers probably would not arrive at the same conclusions, as one who judged the same flowers by the standard rules which hold the circle, the thick and smooth petal, the sharply defined eye, and distinct division of colors, as the only true marks of perfection. A hand bouquet may have its colors inlaid like mosaic with very good effect, and if the coloring be well toned and contrasted, such a bouquet made with skill, like prize pansies, would compel any one who saw it to admire, although many would object to it

as stiff and unnatural, which it certainly is, but a handsome bouquet nevertheless.

There are some flowers whose colors repel all close communication with others; such are the purple, ruddy purple, and most of the striped carnations, all roses with even a tinge of purple, (and this includes most of the hardy roses, as well as others,) in fact, there is scarcely any shade of purple which can be used to advantage in bouquet making. Excepting blue like that of the violet, there is scarcely any shade of blue even, which can be advantageously used in a closely arranged bouquet, and the violet, beautiful though it be, is a very ineffective flower by gaslight; still more so is the favorite heliotrope. Many shades of yellow are harsh, yet some may be used with good effect in bouquets, particularly when toned with blue; for example, the racemes of acacia pubescens, either in bud or blossom, as a bordering fringe are exceedingly beautiful and put to shame that over-fastidious taste which rejects all yellow flowers. Even established rules on colors fail to guide us always in the arrangement of flowers. Artists tell us that blue and green should never come together, yet the violet can have no more beautiful setting than its own green leaves, while dark blue flowers show to equal advantage in their darker green foliage. In Nature's own setting, all flowers are becoming; it is only by placing them at a disadvantage that they can ever appear otherwise; but so infinite are their shades and forms that their perfect arrangement in bouquets must ever be a work of taste and skill. We would not assert that bouquet makers, like poets, "are born, not made," yet we know that many in this, as in other callings, are, and ever will be, utterly unfitted for the work they undertake.

Funeral flowers are now a very important part of the florist's trade. Ten years ago, ten dollars' worth of flowers were more rare at a funeral in New York than one hund-

red now, and sometimes one funeral demands a thousand dollars' worth. The wreath and crescent wreath are undoubtedly the best forms for this purpose, and the cross is a favorite and beautiful emblem. An upright cross of flowers, solid on all sides, with a base of the same, is a very striking object, but unless well and richly made, were better left alone. Anchors, crowns, baskets, and bouquets, are all used for the same purpose. In any of these forms, the slightly rounding surface is the best; that is to say, the flowers in the wreath, cross, &c., must neither be flat nor too highly rounded.

It has ever been a matter of wonder to the workers in flowers how such a preponderance of white is required. Most of them have not realized (although often practising it) that the most beautiful colored bouquets have always a large proportion of white in their composition. When we consider that white flowers are used, in quantity at least, equal to flowers of all colors collectively, and add to this the large amount of white flowers used alone for funerals, weddings, church offerings, &c., we may more readily conceive how important the raising of white flowers is to all flower growers. We believe it is safe to affirm that no one in the flower business fairly discovered this necessity, until the vastly increasing demand for flowers in late years forced it upon his attention, and compelled growers to the production of white flowers as the most important part of their business.

Bouquet making is no longer a paltry business; the trade in flowers, in New York at least, has fairly outgrown that of flowering plants, and when so much of this work is required, and when that well done is so much more valuable, it becomes worthy of more study and attention.

Many people have little idea of the value set upon flowers by some of their fellow mortals. In New York, during winter, twenty-five cents is a common price for a handsome rose-bud, the same per dozen for violets,

while camellias vary from one dollar each, when scarce, to twenty-five cents when plentiful. At Christmas and New Year's, camellias are frequently sold from two to three dollars each. The price of hand bouquets varies from fifty cents upwards. What florists call good hand bouquets sell at about five dollars, extra fine from five to ten; occasionally they bring still higher figures. This writer has sold not a few at fifteen, and on rare occasions has received twenty dollars for a hand bouquet, and that from men who knew well the usual prices of flowers. To give the uninitiated some idea how these things are used, we may mention having seen a belle at an evening party in New York, carrying a bouquet in each hand, while three others were strung from each arm as trophies of her prowess among the simpler, if not the softer sex. Of course this display could not last long; the very weight of her attractions would speedily compel her to surrender, for be it remembered those eight bouquets certainly contained about sixty camellias alone. We have known rich and fashionable belles even more favored than this, and have heard of one having fifteen splendid hand bouquets sent for one occasion. We have never, however, heard of another showing such muscular prowess in their display. Baskets of flowers commonly sell from five to twenty-five dollars, stands from fifteen to fifty, extra large stands from fifty to a hundred. We have heard of two hundred and even three hundred dollars being paid for one. Bouquets for refreshment and dinner tables range from five to fifty dollars each; we have ourselves made one at one hundred. The prices of wreaths, crosses, &c., vary from five to twenty or thirty dollars; from five to fifteen is a common range. On one occasion a New York florist is said to have supplied three thousand dollars' worth of flowers for a private entertainment, but two or three hundred is more common, and esteemed a very good order.

A business, which in New York alone amounts to hund-

reds of thousands of dollars annually, will soon assert its own position, and it is for those engaged in it to make or mar it, as they conduct it more or less respectably. As Americans assuredly pay better prices for their bouquets than any other people, let the florist see to it that they get the finest and best arranged flowers.

We must apologize to the general reader for the minute description and the technical terms used in detailing the *modus operandi* of construction, but it is necessary to be thus particular, to be properly understood by such as are interested in the subject. So many flowers have short or unmanageable stems, or grow so close to buds which the grower cannot afford to cut, that artificial stems must be largely used. Even where stems are available, the bouquet maker in all good work prefers having another added to hold the flower in position, the strength of the stem being proportioned to the weight of the flower it bears. Thick stems must be avoided, else the bouquet handle becomes clumsy,—a very objectionable feature, as amateurs speedily discover, particularly when using flowers on their own stems. The stems commonly used are of broom-corn or straw matting, cut in lengths as desired, from four to eight inches. With this and hair wire cut to three inches, the "stemmer" goes to work. By a rapid twist one end of the wire is fastened on the straw, and the flower is attached by a whirl of the stem between finger and thumb, as in figure 56. Stemming is a large part of the labor of bouquet making, and rather distasteful to the amateur. One bouquet maker requires two stemmers, and a very prosy business it soon becomes to both, and vastly less interesting than the growing of

Fig. 56.

flowers. Strong spool cotton or shoe thread is used for tying up the flowers. Camellia stems being entirely unavailable, a wire the thickness of a pin is passed through the calyx of the flower, the ends being twisted together It is then stemmed on a light, dried willow—which admits of bending to the required position—with sufficient moss wound under the flower to prevent its outer petals being at all compressed, when set in the bouquet. Without some such provision it is impossible, either to attain the rounding outline of the bouquet, or to display the flowers in perfection.

With flowers prepared, let us take a camellia for the centre of our bouquet, tie it securely to the bouquet stem (a piece of kite stick or stiff twig), and wind moss around it, as already described, to keep the flower from outer pressure, the moss running to a point about two inches below the flower. Six tea rose-buds are now set at regular intervals around and on a line with the outer petals of the camellia, and the spaces between these each filled with a small piece of white eupatorium, a very small geranium leaf or point of delicate green being set by each bud. A little moss is now wound lightly, close under the flowers, to prevent crowding, a pink carnation set behind each rose-bud, with tuberoses between, a speck of eupatorium being inserted under the edge of each tuberose, to fill out. Six white camellias of equal size and form, stemmed as described, are now set at regular intervals around, particular care being taken to form with the face of these flowers the correct outline of the bouquet, and their stems tightly bound, to prevent working out of place. Between each camellia, on the inner side, another tuberose is set, filled out with a speck of stevia under each side; more moss is added, and a bright speck of crimson bouvardia forms the sole dividing line between the centres of the camellias—which nearly touch each other. A tea rose-bud follows, with a violet set in

sweet alyssum on one side and a small geranium leaf in the same on the other; a white carnation is set behind each bud, with a speck of bouvardia in eupatorium on each side. A light border of stevia is now set around the whole, and with camellia leaves of equal form stemmed on willows, and projected nearly half their length, the bouquet is finished. The back is trimmed with bouquet green, or fine leaves of any evergreen. The handle is cut to about three inches, and being a hand bouquet, is wrapped with tinfoil, wound over, and neatly tied above with a bow of white taffeta ribbon.

The outline of the bouquet must be carefully kept as the work proceeds, and sufficient moss from time to time packed lightly in front and immediately under the flowers. By this means the weight of the structure is borne by the stems, the flowers being only allowed to touch each other. Moss not only serves well to keep the flowers apart, but acts as a sponge when the bouquet is set in water, giving moisture to flowers with the shortest stems; and bouquets thus made are more durable than the casual observer—who gazes regretfully on the beheaded flowers—is apt to imagine. When, in addition to the moss, a piece of wet cotton is stemmed to every flower, (as the writer has all good work done,) the natural stem is not unkindly superseded. The maker must work with a tight thread, to prevent the flowers from getting out of place, and keep a clean surface on the handle. Another method of bouquet making is to tie a ball of moss rather loosely on the bouquet stick and insert the flowers (which are stemmed to suit the work), drawing them down to the desired position, and tying as the work proceeds.

Vase bouquets are made similarly, with more green "backing" between and around the flowers, for loose arrangement and to support the greater weight. Flower baskets are lined with tinfoil, or, if not likely to show after filling, any tough paper will serve the purpose; they are

then filled with sawdust, rounding above, damped and covered with wet moss; a border of arbor-vitæ, bouquet, or other greens is set around, to support the overhanging flowers. The flowers, stemmed on pieces of match stick, (fig. 57,) or twigs, are now inserted according to the taste of the worker, with moss packed between them as the work proceeds. Baskets thus filled and sprinkled with water keep well, but the more common method is to insert bouquet green (Lycopodium) over the whole surface, and arrange the flowers therein without any moss packing. Wreaths are commonly made on a stout wire, which has a straw of matting wound to it, to enable the thread to hold; a backing of green is laid for the flowers as the work proceeds. Both green and flowers must be wound on with points projecting to each side, the stems crossing like the letter X. If laid straight along, the flowers are huddled together, and the arrangement seems thick backed and clumsy. When the desired length is attained the ends are firmly tied, and flowers and green together are pressed round on the wire, and by this means turned to face as required; a bow of white silk bonnet string finishes the wreath. Crosses are made on two pieces of thin wood; the three upper points being made, the cross-stick is then tacked and tied in its place, the centre filled, and so wound to the bottom. Like wreaths, these may be finished with or without a bow of ribbon. Wire frames have to a great extent superseded these old methods of winding flowers to sticks and wires. These are made from half to three quarters of an inch in depth—that is,

Fig. 57.

with raised edges—and painted green, the breadth varying with the circumference. The frame gives the florist at once the desired form, and makes it easy work for any person of taste to arrange flowers in the shape of an anchor, star, &c., &c. The frame is filled with damp moss, wound slightly to keep it in place, and the flowers, stemmed on short twigs, are inserted in the moss.

CHAPTER XXVII.

WIRE DESIGNS FOR CUT FLOWERS.

Florists who have not yet made use of wire frames for designs of flowers, will be surprised at the facilities they afford in constructing such decorations. They are now used exclusively in New York for such work, the low

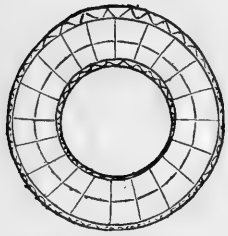


Fig. 58.—WREATH.

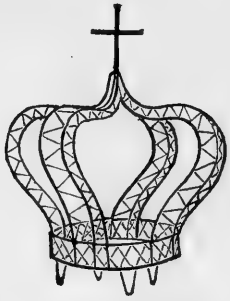


Fig. 59.—CROWN.

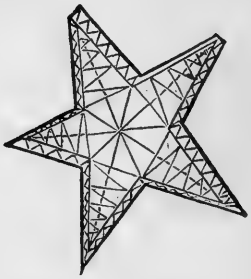


Fig. 60.—STAR.

rates at which they are sold saving more than the cost of the labor of making them by the old methods, besides giving correct shape to the different designs. By having an assortment of these frames on hand, a dealer can supply an order in a surprisingly short time. The manner of filling the frames is described in the preceding chapter. It is a very common practice to cover the edges of the frame, and even the whole surface with tinfoil; the flow-

ers are readily put through this; it hides the moss, prevents any small particles from escaping, and at the same time serves to prevent evaporation from the damp moss.

To those who object to the formality of flower designs

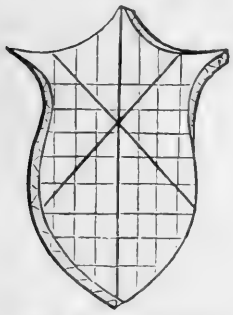


Fig. 61.—SHIELD.

Fig. 62.—HARP.

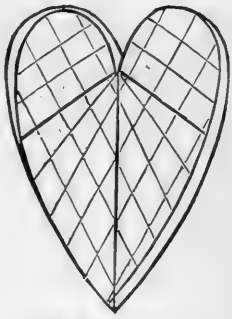


Fig. 63.—HEART.

for funeral or for other uses we would ask what they would substitute, or if flowers are to be given in what better shape can the offering be presented? To those who object that they are made the objects of bargain and sale, we say so may be the carriage in which you attend at the

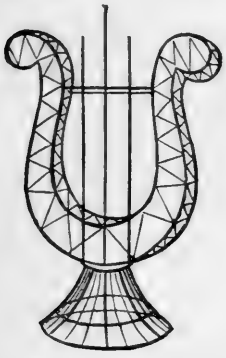


Fig. 64.—LYRE.

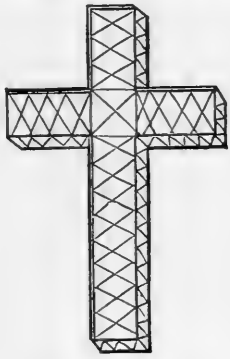


Fig. 65.—CROSS.

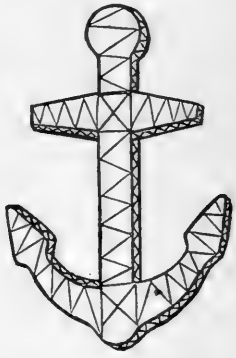


Fig. 66.—ANCHOR.

grave to show your sympathy. It does not show less sympathy if it involves sacrifice, and the greatest sacrifice which many can give is money—money expended often from a slim purse in purchasing a last tribute of respect to the memory of a departed friend.

CHAPTER XXVIII.

HANGING BASKETS.

It is only of late years that the taste for hanging baskets has become so universal, possibly induced by the beautiful specimens of this kind exhibited in such variety and profusion at the Crystal Palace, of London, a dozen years ago. The taste has extended to every town and hamlet throughout the land. The baskets are made either of wire-work, earthenware, or of rough and gnarled roots or limbs, to form "rustic" work. The wire and rustic baskets are the kinds in most general use.

Only certain kinds of plants are suitable for hanging baskets; such as are of low, compact growth, to cover the surface, and such as are of drooping or trailing habit, to hang over the sides. For a basket of one foot in diameter we name the following as suitable:

Coleus Verschaffeltii, a well-known bronze-foliaged plant.

Centaurea candida, a plant with white, downy leaves, of compact growth.

Geranium, Tom Thumb, scarlet, dwarf and compact, blooming all summer.

Sedum Sieboldii, a plant with light glaucous leaves and graceful habit, which is not only desirable on account of its foliage alone, but for its purplish rose colored flowers.

These are suitable for the upper surface of the basket. Those proper to plant near the edge of the basket are:

Lobelia Erinus Paxtoni, blue, drooping 18 inches.

Tropæolum, Ball of Fire, dazzling scarlet, 18 inches.

Lysimachia nummularia, bright yellow, 18 inches.

Linaria Cymbalaria, small flowers, graceful foliage.

For a basket of two feet in diameter the under-named make a fine display. For the center:

Geranium, Mrs. Pollock, foliage, crimson, yellow, and green; flowers, bright scarlet.

Centaurea gymnocarpa, foliage, fern-like, whitish gray, of a peculiar graceful habit.

Fig. 67.—PANICUM VARIEGATUM.

Sedum Sieboldii variegatum, glaucous green, marbled with golden yellow.

Achyranthes Gilsonii, a beautiful shade of carmine foliage and stem.

Alyssum dentatum variegatum, foliage, green and white, with fragrant flowers of pure white.

Alternanthera spathulata, lanceolate leaves of pink and crimson.

Pyrethrum, Golden Feather, fern-like foliage, golder yellow.

For the drooping plants:

Maurandia Barclayana, white or purple flowers.

Vinca elegantissima aurea, foliage, deep green, netted with golden yellow; flowers, deep blue.

Cerastium tomentosum, foliage, downy white; flowers, white.

Convolvulus Mauritanicus, flowers, light blue, profuse.

Solanum jasminoides variegatum, foliage, variegated; flowers, white, with yellow anthers.

Geranium peltatum elegans, a variety of the Ivy-leaved, with rich, glossy foliage, and beautiful mauve-colored flowers.

Panicum variegatum, a procumbent grass from New Caledonia, of graceful habit of growth, with beautiful variegated foliage, striped white, carmine, and green. One of the most valuable plants for baskets or vases that has been recently introduced. It requires a plenty of heat. Fig. 67 inadequately represents it, as it was taken from a very inferior specimen.

In setting the plants in the hanging baskets, a layer of moss at least an inch in depth should be spread over the bottom and sides, so that the water may be held and prevented from washing through.

To have the plants bloom freely, they should be hung where they will be exposed to the sun at least two or three hours each day, and in dry weather copiously watered daily. If the surface of the basket between the plants is covered with moss, it will prevent the earth

from drying out so soon, and will give a neater appearance to the basket. The soil used to plant in may be that suitable for potting ordinary plants, as described under the head of soils.

CHAPTER XXIX.

PARLOR OR WINDOW GARDENING.

To be successful in growing plants in the window of the parlor or sitting-room, it is of the first importance to begin with plants that are in a healthy state.

Florists, with all their appliances for successful culture, often fail to bring health to a sickly subject. How, then, can our amateur friends hope to recuperate the weakened energies of some petted plant in the less congenial atmosphere of an ordinary dwelling-house? I well know the usual practice of our lady friends in this matter. In purchasing their supply of bedding plants from the florist in May, all are taken from the pots and planted in flower beds, to decorate the borders for the summer months. By the first appearance of frost in October, the plants of Bouvardias, Carnations, Fuchsias, Geraniums, Heliotropes, Roses, &c., &c., that were such tiny slips when planted out in May, are now, many of them, large plants, and in all their glory of bloom; but Jack Frost shall not have them, they shall be saved. Pots are sent for, soil of the most approved brand is procured from some florist high in the art, the plants are lifted up with all care and placed in the pots. Our amateur friend is in raptures; as yet they look just as green and flourishing as when growing in the garden. But a day passes, and although they have been shaded and watered with all care, the plants some-

how begin to show symptoms of collapse. The Geranium leaves, that looked so green and well, are now soft and flabby. The Rose-buds, that held up their heads with pride, now look abashed and hang down.

This state of affairs continues: from the leaves being simply wilted they begin to get yellow and shrivel up; by ten days, many of the plants have died outright, and the remainder are in a sad looking condition, that is disheartening to the owner.

No other result than this will ever be obtained with plants treated in this manner. When florists wish to lift plants of this nature in fall, two-thirds of the shoots are usually cut off, and the plants put through a course of treatment to induce them to strike new roots, that it is hardly ever in the power of the amateur to apply; but even though we succeed in saving the plants, it is almost always at the expense of the bloom, for few plants can be lifted in bloom in October from the open ground and continue to blossom throughout the winter. Now, having pointed out the errors, I will show the way to succeed in obtaining healthy plants that will grow and bloom freely in winter, provided they are supplied with the necessary moisture and heat. All plants that are intended for house plants in winter, when set out in May, should be first placed in pots, 6 or 7 inches in diameter. These pots should be planted, or, as we term it, "plunged" to the rim, or level with the surface; thus they are almost in the same condition as if they had been planted without the pot, only the roots are confined inside of the pot, so that when the plant is lifted in fall there is no mutilation of the roots, as must always of necessity be the case when the plant is put in the open ground, as the roots ramify in all directions. One caution, however, is necessary: the hole in the bottom of the pot must be effectually stopped up so that the roots cannot strike through, or the pot should be turned around two or three times during the

course of the summer, so as to break off the roots as they strike through the bottom. If this is not done, nearly the same difficulty will be experienced as if they had not been potted in spring. But if proper attention has been given to this, plants of every description that are suitable for winter will be in fine state by the time of taking up—in this district, the 1st of October — as by this time there is danger of frost.

The following list comprises those plants most suitable for window culture, and such as are most easily managed and least expensive.

Calla, (*Richardia*,)
Carnations—monthly sorts,
Cyclamens,
Chrysanthemums,
Chinese Primroses,
Fuchsias.
Hyacinths and other Bulbs,
Geraniums, Variegated, Zonale, Scented, and Ivy-leaved.
Heliotropes,
Pelargoniums,
Roses—Tea, Bourbon, and Bengal,
Camellias and Azaleas.

All of these will flower and grow freely in a green-house temperature, or at an average of not more than 50 degrees at night, with 15 or 20 degrees higher during the day.

We add another list of plants requiring a higher temperature, some of them being in other respects more difficult of culture, besides being more expensive:

Bouvardias of sorts,	Begonias,
Cissus discolor,	Euphorbias,
Stephanotis,	Poinsettias,
Tuberoses,	Orchids,
Ferns,	Lycopodiums.

All of the above will luxuriate best in a humid atmosphere, at an average of not less than 60° at night, with

15 or 20 degrees higher during the day. The best aspect for growing plants from October to April is due south. For the intermediate season, east is preferable. Watering is a very important operation, but a little experience with plants, and ordinary care in observing, will soon show when this is required. A good deal depends on the condition of the plant; if in vigorous growth there is but little danger of giving it too much. On the other hand, if the plant has been cut back or lost its leaves, water should be given sparingly. For example, you may take a vigorous growing apple or pear tree, and saw off its limbs to the trunk in midsummer; if its roots are kept saturated with moisture it will die, but if kept dry it will shortly again develop branches and leaves. This example teaches us a lesson in more artificial culture, that in proportion to the vigor of the subject should its food be supplied. The practice of placing the pots in saucers filled with water is destructive to the health of the plants, as, of course, as long as the water remains in the saucers the soil is absorbing it and the roots of the plant are saturated; it is well enough to use the saucers to prevent the soil from washing through, but the water should be applied at the surface of the pot, and what little will pass through into the saucer will do no harm. Another source of annoyance to those growing plants in rooms is the various insects that attack them. The most common and injurious of these is the Aphis or Green Fly. In our greenhouses we keep this little pest in check by continued fumigation with tobacco, but as this would not be practicable in rooms, recourse must be had to immersing the plant in tobacco water, made to a strength having about the color of strong tea. By dipping the plant in this once in two weeks, or, when the plants are large, syringing them with it, they will never be seen. The Red Spider and thrip are not so easily got rid of, but fortunately they are not so common or injurious, unless in a very high temper-

ature and dry atmosphere. The only way of arresting them is by syringing or immersing as for Green Fly.

There are no special soils necessary for the amateur to trouble himself about in cultivating parlor flowers. For our opinions on this head, see chapter on soils. Neither should he tamper with guano or other fertilizers; equalization of temperature and moisture will secure the end desired.

WINDOW-GARDENING IN LONDON—COTTAGE GARDENS.

One of the most refreshing sights to an American arriving in London during the summer months is the wonderful diversity and beauty of the flowers cultivated in the windows and balconies of the houses. In some of the best streets hardly a house can be seen that is not so adorned, and even the most squalid abodes of vice and poverty are often relieved by a miniature flower-garden on the window-sill. The most common style is the window-box, made to fit the window, usually from four to five feet long, and about six to eight inches wide and deep. It is made of every conceivable pattern, of terra-cotta, cork, and rustic design in endless variety. The plants used are not very numerous in variety, being selected of kinds suited to keep in bloom or to sustain their brightness of foliage. Now and then the ribbon-line planting is adopted on the balconies; a very handsome box in this style had first a row of Moneywort (*Lysimachia nummularia*), which formed a drooping curtain of four feet in length; half-way down on it drooped blue Lobelia; then upon the Lobelia fell a bright yellow Sedum (Stone-crop); then against the Sedum, for the top-line or background, a dwarf Zonale Geranium, a perfect blaze of scarlet. Hardly two of these window decorations were alike in the best streets, and varied from a simple box of Mignonette or Sweet Alyssum to cases filled with the rarest ferns or orchids. The effect as a whole is most pleasing, and one that can not fail to strike the most indifferent ob-

served as an agreeable change from the seemingly never-ending brick and stone of the city. The window-gardening is not confined to private dwellings, but all the leading hotels are so decorated. In the dining-room of the Langham Hotel (said to be the largest in England), some hundreds of well-grown speciments of plants are placed in the windows, and kept in perfect order during the entire summer. The selection of plants is made regardless of expense, and in looking around the dining-hall it is with some difficulty that you decide if you are not dining in the midst of a vast conservatory, so redolent is the air with the perfume of flowers. The same taste for window-gardening is displayed, more or less, in all the English towns and villages, and even the humblest thatched cottage of the peasant by the wayside is given a look of quiet happiness by the bower of flowers in the window. How different the look of these humble homes, where the occupant is receiving barely $4 per week, to the squalid shanties in the suburbs of our great cities in America, where the "naturalized" American citizen is earning three times that amount!

Here let me deviate from my text, but to a kindred subject, and tell how the English cottager works his garden in some of the old towns, such as Colchester. To each cottage, renting for about $50 per year, is attached a garden of something more than an eighth part of an acre in extent. In this little spot the tenant contrives to grow four to six kinds of vegetables, such as potatoes, cabbage, peas, turnips, etc., and of fruits, gooseberries, currants, raspberries, and strawberries. Every foot is made to produce something, and rarely a weed was seen in some scores that we saw ranged side by side. The heavy work is done by the man of the house, "before or after hours," in his own time. In the weeding and hoeing he is assisted by wife or children. There is great rivalry among the different owners of these cottage gardens, and

in many places liberal prizes are given by the horticultural societies to those that are best cultivated.

Prizes are also offered for the best window-grown plants, and in Hull and some other towns, plants are distributed and printed instructions given for culture to encourage the taste.

CHAPTER XXX.

WARDIAN CASES, FERNERIES, &c.

The Wardian Case is usually made with black walnut base lined with zinc, in depth about 6 inches, and about 2 feet square on the sides; but it is made of various sizes. The covering is a glass case, made usually 18 inches high; the top or lid, also of glass, is made movable, so that ventilation is provided, and undue moisture allowed to escape. The plants grown in Wardian Cases are such as are peculiar for beauty of foliage rather than flower—plants whose natural habitat is shady woods; such as Ferns, Lycopodiums, Caladiums, Marantas, &c., &c. The soil used in such a case may be light peat or leaf-mould; nothing of a stiff or heavy nature of a soil should be used. The case may be kept in any ordinary sitting-room, near the window, but not exposed to the direct sunlight. There is no trouble whatever in management; one moderate watering when the case is filled will keep it without further attention for six weeks, except an occasional ventilation when moisture lies heavy on the glass. In winter the temperature of the room may run from 50° to 65° at night. The culture of Ferns or Lycopods requires somewhat similar conditions as are found in the Wardian Case; they can not be successfully grown unless

in partial shade in a close, moist atmosphere. Hence it is useless to attempt the cultivation of such unless they are inclosed in cases in the dry atmosphere of an ordinary sitting-room. The florist can easily adapt his green-house to the proper conditions when required, but the amateur must secure these by means of a closed case of some kind. For single specimens or a few ferns and the like a glass shade with a proper base of metal or earthenware is frequently used, and is very ornamental. Ferneries of this kind are sold at the principal horticultural and seed stores.

CHAPTER XXXI.

FORMATION OF ROCK-WORK.

This feature of pleasure ground decoration is generally necessitated by circumstances; if the ground which has to be chosen for that purpose is naturally stony, it often becomes the cheapest way to get rid of the stones, grouping them so that they become ornamental. They may often thus be used to advantage in forming breaks or screens, to hide the flower garden from the vegetable or fruit garden; in this way they are laid up in rugged walls, the interstices filled with soil and covered with hardy perennial plants. Locations where rocks exist in their natural condition can often be made highly interesting and ornamental by setting out plants of a drooping or trailing habit to overhang among them. Among those suitable for such purpose are:

Achilleas, of creeping growth,
Campanulas, of creeping growth,
Crucianella stylosa,
Cerastium tomentosum,
Linnæa borealis,
Lychnis grandiflora,
Lysimachia nummularia,
Orobus vernus,

Phlóxes, of creeping growth,
Polemonium reptans,
Saxifragas,
Sedums, of all kinds,
Sempervivums, of all kinds,
Soldanella alpina,
Vinca major variegata,
Thymus vulgaris variegata,
Violas of sorts.

Artificial rock-works are often formed. The shape and dimensions of the work being determined on, the clinkers from furnaces are collected, and dipped in hot lime wash, which gives a coloring of pure white to their fantastic shapes. With these the "rock-work" mound is formed of the height and shape desired, leaving at suitable distances cavities of 6 or 8 inches deep, to be filled with soil in which to place the creeping plants. For this kind of rock-work a different class of plants is more appropriate, —such as are of bright colors and will contrast with the ground-work of white.—Scarlet or other high-colored Verbenas, Coleus, Gazanias, Scarlet Geraniums, Blue Lobelias, Lysimachia, or Golden Moneywort, may be used with excellent effect. By the use of hydraulic cement instead of lime, the rock-work can be made of a pleasing drab color. A rockery so formed and planted, without having any pretensions to being "natural," is always an interesting and attractive object on a well-kept lawn.

CHAPTER XXXII.

INSECTS.

There is no subject referred to in this volume, that I feel so incompetent to discuss as that of insects. Not that our experience with the pests has not been ample enough, but all the knowledge obtained from that experience leaves us at times utterly helpless to prevent their ravages, particularly on plants grown out of doors. Un-

der glass we may say that they are entirely under control, and I have always considered that no better evidence of the incompetency of the person in charge of a green-house could be had, than to see the plants covered with insects.

The most annoying of all insects of the flower garden, is the

Rose Slug, *Selandria Rosæ*, a light green, translucent little fellow, varying from 1-16 of an inch to nearly an inch in length. There are evidently two species or varieties, one of which confines its ravages to the lower side of the leaf; the other eats it entire. The first is by far the most destructive here. In a few days after the plants are attacked they appear as if they had been burned.

The only remedy we have found is a preventive one, which, in fact, ought to be used against all insect life. Before the leaves of the roses appear, just as soon as the buds begin to develop, apply whale oil soap, in the proportion of one lb. to eight gallons of water; this, steadily applied for ten days, with a syringe or garden engine, has, in my experience, entirely prevented the attacks of the insect. But once let it get a foothold and it can hardly be driven off by this application, unless it be made strong enough to injure the foliage, making the remedy worse than the disease. The species of Rose Slug that eats the entire leaf seems to confine its depredations more to young plants, and later in the season. We have found it quite troublesome in June and July among our young roses, which had been planted out in May and June, and as these were young and tender plants, the whale oil soap remedy could not safely be applied; so we have often had acres of young roses covered by myriads of these slugs, before they were observed, and nothing could be done except to shake the plants, and kill the insects when they fell to the ground. In the summer of 1866, we had some nine or ten boys shaking the plants and killing the slugs, for upwards of a week, and by this means saved our crop

of roses. Last season (1868), we had a whole army of volunteer exterminators, in the thousands of English Sparrows that have recently favored us with their presence, and which we feed and house with the greatest care during winter. We observed immense flocks of them actively engaged for days in picking up something in our rose beds, and had imagined it to be seeds obtained from the refuse hops, that we had used as a mulching. At times we felt inclined to believe that they would pick the tender leaves of the rose, to use by way of a salad, having always believed them to be strictly "vegetarians," or seed eaters. Finding, however, that we were less troubled with the Rose Slug that season than usual, it occurred to me that perhaps we were indebted to our noisy, feathered friends for the immunity. To test the matter, a victim was necessary; accordingly a plethoric looking fellow was shot, when, sure enough, his well-stuffed crop revealed seeds, Rose Slugs, and Aphis, or Green Fly, in great abundance, demonstrating beyond all question the great value of these birds as insect destroyers.

The **Rose Bug** (*Macrodactylis subspinosus*), or Rose Chafer, as it is sometimes called, is so named from its attacking the buds or blossoms of the rose, in preference to anything else, although it is destructive to many other plants, particularly to the Dahlia, the flower of which it devours rapidly. All the ordinary remedies seem to fall harmlessly on the Rose Bug, and if not destroyed by hand its ravages cannot be stopped, unless our feathered friends come to the rescue; whether they will be equally efficacious in destroying the Rose Bug, I am unable to say, although I am inclined to think they will. We have never yet been much troubled with them here, and so far have not had the opportunity of knowing whether the Sparrows feed on them or not.

The **Ground** or **Blue Aphis.**—This is one of the most subtle and most dangerous of all the pests with which we

have to contend in the cultivation of flowers. Hundreds of my amateur friends come to me year after year, with sorrowful tales of their verbenas, asters, &c., which were pictures of health and beauty, but now are one after another sickening and dying, apparently without cause. But there was a cause, and one cause only. The Aphis was at work on the roots. But the remedy? Alas! almost hopeless at this stage of the disease. Still, as a physician must prescribe in all cases, we say that the only chance is an application of tobacco water, about the color of strong tea, applied copiously and persistently to the roots, for at least a week.

We have occasionally saved all our stock by this remedy, when used at once, as soon as they were seen to be affected. Many species of plants are attacked by this insect. Asters, particularly, are much injured by it. In fact, when in excess, there is hardly a species of plant exempt from its attacks. We have often seen this Aphis clustering by thousands on the roots of melons and cucumbers, to the very points of the roots, a foot below the surface.

The Green Fly, or Plant Louse, is not so hurtful in the open air as many other insects, and is easily got rid of either by syringing with whale oil soap or tobacco water, in the degrees of strength before named.

The Red Spider is rarely seen in the open ground, except in a hot and dry atmosphere, when it is often very destructive in dry, sheltered gardens, during the months of July and August. Frequent syringings of whale oil soap will hold it in check.

Ants.—Although these are not generally to be feared in the green-house or flower-garden, yet we have occasionally suffered by them and have found the simplest way to destroy them to be to lay fresh bones around their haunts. They will leave everything else and attack these; when thus accumulated, they can easily be destroyed by dipping in hot water.

We now come to the insects which are troublesome under glass; here we have the means within our control to entirely prevent the two leading insects, *Green Fly* and *Red Spider*. In both cases, I have always contended that "an ounce of prevention is better than a pound of cure." There is no neglect of the gardener or foreman in charge of green-houses which is so little excusable as allowing insects to injure his plants.

Green Fly (*Aphis*) is *prevented*, (for I contend that it should never be seen, so that it need be destroyed), by fumigating with tobacco smoke, not less than twice each week. We do it in a manner much more simple and agreeable to the operator than is often practiced. Two or three times each week during the entire season at which our green-houses are filled with plants, we use a small handful of shavings, on top of which we place about half a pound of tobacco stems, previously made damp. The shavings are lighted, and the fire being on the brick flooring, is left to take care of itself. We use this quantity of tobacco to every 500 square feet of glass; we burn thus five to six tons of tobacco stems every season, but we rarely see a green fly. We have occasionally seen this insect increase to such an extent in its different conditions, that fumigation was powerless to destroy it, or rather it would have required it to be applied so strong, to dislodge the vast number of the enemy, that the plants would have been injured. The safer way to treat a desperate case of this kind is to brush the insect off by hand, or with a soft brush; this is a slow process, but an effectual one. This condition of the plants can only be the result of utter neglect. The green fly sometimes injures plants which stand too near together, so that the leaves get matted so closely that the fumes of the tobacco cannot penetrate. This is a condition, where recourse must be had to brushing the insects from the leaves, and, if possible, spreading the plants, so that the air can pass freely among them.

The **Red Spider** is rather a more insidious enemy than the green fly, and far more tenacious of life, and often does much mischief before its presence has become known. The experienced gardener, of course, should not only be able to detect its presence, but also to discover the atmosphere favorable to its production. A dry and hot atmosphere, so dry that few plants can long continue in health in it, is such an one as this pest delights to revel in. Such an atmosphere in hot-house or green-house is thus doubly hurtful to plant life, and therefore should never be allowed. The remedies are simple; if there is not time for syringing, let water be thrown copiously on the paths, under and on the benches, place pans filled with water on the flue or pipes, or use any other means that may suggest itself, to counteract the aridity of the air, due to heavy firing in winter, or hot, dry days in spring or summer. Therefore, as in the case of the green fly, if proper preventives are used, the red spider need never be seen in the green-house.

The red spider is an exceedingly minute insect, so small that it is a mere speck when seen by the naked eye, but when closely examined, may be seen moving with great rapidity. Though minute in themselves the presence of these insects may be quickly detected, by the upper side of the leaves becoming browned, though, as a general thing, their ravages are confined to the under side of the leaf. Parlor plants are often subject to this insect, as it is not convenient to give the necessary moisture, and the only remedy in such cases, if the collection is not too numerous, is sponging the leaves.

We often have woeful complaints from our lady friends, that their plants all get brown and look sickly, and it requires but little thinking to divine what enemy is making the attack.

The aphis, from its size, is quickly seen, and means may be used at once to destroy it, but this minute red

pest may be sapping the life of a plant for weeks before it is discovered. Amateur cultivators generally expect to see something more tangible in a spider, if they have heard of the red dragon at all, and are often hard to convince, that this minute insect is the cause of so much disaster.

I will relate a rather ludicrous incident, to show that some even of larger experience may become possessed of that notion.

Some twelve years ago, I had in my employment an active young Irishman, who, by showing more than ordinary energy, quickly passed through the different grades, until he was duly installed as foreman; at that time we had been firing a Camellia house, and by neglect of keeping a properly moist atmosphere, the red spider had made sad inroads. John was duly instructed to syringe the plants, night and morning, to destroy it, which he did; no doubt with a double object in view, as the sequel will show. John was on all occasions rather demonstrative, but one morning he came rushing towards me, his face radiant with triumph, with his hat off, but clasped in his hands, in a careful manner, evidently having something of no common value within it. Before I had time to inquire what was the cause of his excitement, he yelled out "I've got him! bedad! I've got him at last!" "What have you got?" I enquired, expecting to see something in the way of a rat or mouse. "Arrah, the big divil himself, the blaggard that has been doin' us all the mischief, the *Reed* Sphider!" and opening his hat, a villainous Tarantula-looking fellow ran out, bigger than a thousand red spiders, which was quickly despatched by John's brogan. From that time John learned to know what the red spider was, but was never anxious to allude to it afterwards.

The Verbena Mite, another pest most disastrous in its ravages on the Verbena, Heliotrope Petunia, Pelar-

gonium, and various other plants, is so small that it cannot be seen by the naked eye; but it produces what is known as "black rust," a disease that in many parts of the country has made the cultivation of these plants, particularly the Verbena, almost impossible.

Viewed by a powerful microscope, this insect, magnified 400 times, appears of the size given in fig. 68; it moves with great rapidity, and can only be examined as it stops to feed. When this little pest has once got a foothold, all direct remedies to dislodge him seem to be powerless; the fumes of tobacco, so destructive to the aphis, or of sulphur, which is death to the spider, fall harmlessly on this microscopic insect.

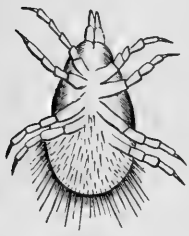


Fig. 68.

There is hardly a doubt but that the fumes of sulphur or tobacco would destroy it, if it had not the power of imbedding itself in the leaf. This is evidently the case, as on subjecting affected plants to a severe fumigation with tobacco for 30 minutes no insects could be discerned on the leaves; but after a short time they again appeared on the field of the microscope, apparently unscathed. Now, although we have no direct remedy against this insect, which produces the black rust, we have, I think, a preventive, by keeping the plants in that healthy condition which seems to be repellant to its attack. For the means used to get that healthy condition, see article on the culture of the Verbena, which is, with slight modifications, equally applicable to all other plants affected by this insect.

The microscope reveals that this particular species, which is so destructive to our Verbena, Heliotrope, Petunia, and scores of other plants cultivated in the greenhouse or garden, is the same or closely resembles that which gives the roughness to particular parts of the bark of cherry, plum, and peach trees, and no doubt is to be

found on thousands of other varieties of the vegetable kingdom, whenever a lessened vitality takes place. Corroborative of this view, I had a lot of about 500 plants of Heliotrope growing in 2-inch pots in one of our greenhouses last fall, one-half of which were, in September, shifted into 3-inch pots, to be reserved for stock plants. They were kept side by side and treated in all respects the same. Those shifted, of course, with increased food, grew vigorously and strong, while the unshifted remained comparatively stunted, and to-day, December 1st, the "black rust" shows itself on nearly every plant, and the microscope shows on every affected leaf hundreds of these insects, feeding like sheep on a pasture field, while on the shifted plants none whatever can be found. This is only one of hundreds of cases which yearly come under our observation, to prove that, from whatever cause the vital action of a plant is impaired, it is placed in the condition which in a greater or less degree invites the attack of parasitic fungi (mildew) or insects.

Mealy Bug, as it is familiarly termed, is a white, mealy, or downy-looking insect, often very troublesome in the hot-house; it is quickly destroyed by a solution of 1 lb. of whale oil soap to five gallons of water; but, as it often attacks plants of the most tender kinds, that are liable to be injured even by this weak mixture, it is not safe for inexperienced hands to use it before experimenting on its strength, and perhaps the safest method is simply to brush off the insects with a soft brush, made for the purpose.

Brown and **White Scale Insects.**—These are less injurious and less common to plants than any of the preceding, and are generally found in dark or ill-ventilated green-houses, adhering to the stems and under part of the leaves of hard-wooded plants. The best remedy is washing, or brushing them off by hand; fumigating, and the

different solutions destructive to aphis, &c., falling harmlessly on these.

Thrips is an active insect, varying in size from that hardly perceptible by the naked eye, to the size of the green fly, and varying in color from whitish-yellow to dark brown; it is a jumping insect, very active in its movements, and when it once gets a foothold is very destructive. It succumbs to tobacco smoke, but not so quickly as does the green fly. It luxuriates in shaded situations, and is generally found where plants are standing too thickly together, or where the ventilation or light of the green-house has been deficient. I think it may be safe to assert that in any well-regulated green-house or hot-house no injury from insects will ever become serious, if proper attention to *syringing* and *fumigating* has been given. Syringing, or other means of keeping a moist atmosphere, must never be neglected for a day, and fumigating by tobacco smoke should be done, at the least, once each week. This has been our own practice for nearly twenty years, and we rarely ever see an insect in our green-houses.

The **"Carnation Twitter."**—This is an insect but little known, and called in this district only by its local name of "Carnation Twitter," given from its rapid and nervous motion. As seen by the naked eye it is about the twentieth part of an inch in length, and of a thickness not more than that of a cambric needle. It is of various shades of color, from green to black; it is never very numerous on the plants, but most destructive and evidently poisonous in its attacks on all varieties of the Carnation and Pinks.

Its effects on the Carnation somewhat resemble those of the red spider, except that when attacked by the "Twitter," the leaves have a cankered and twisted appearance, easily distinguishable from the browning effects of the spider. When Carnations or Pinks get

infested by this insect, all remedies to dislodge it seem futile. We have lost thousands of plants in a season by its attacks. It seems, however, to infest light or sandy soil more than heavy loam or clay, and seems, also, to be intermittent in its attacks, often not being seen for three or four years in succession, and again returning and destroying all in its path. In our light, sandy soil at Jersey City we suffered severely from it, but for five years, in our heavy, clayey soil in Bergen, it has rarely been seen.

CHAPTER XXXIII.

ARE PLANTS INJURIOUS TO HEALTH?

If physicians are asked if plants are injurious to health, three out of six will reply that they are.

They will generally follow up the reply by a learned disquisition on horticultural chemistry; will tell you that at night plants give out carbonic acid, which is poisonous to animal life, and consequently if we sleep in a room where plants are kept, we of necessity inhale this gas, and sickness will follow. These worthies generally succeed in their specious reasoning, and the poor plants, that have bloomed gaily all summer, are often consigned to the coal cellar, for their winter's quarters, if given quarters at all. No theory can be more destitute of truth; that plants give out carbonic acid may be, but that it is given out in quantities sufficient to affect our health in the slightest degree is utter nonsense.

No healthier class of men can be found than green house operators, which makes me sometimes think that plants have a health-giving effect rather than otherwise. But doctors may tell us that our workmen are only at work in the day-time, and that it is at night that the carbonic acid

is emitted. Here we meet them by the information that in most cases the gardener in charge of green-houses often has to be up the greater part of the night in winter, and the green-house, from its warmth, is universally taken as his sitting-room, and sometimes as his bed-room; such was my own experience for three winters. I had charge of a large amount of glass, situated nearly a mile from my boarding-house, too far to go and come at midnight, with the thermometer below zero. Our means of heating were entirely inadequate, so that the fires had to be looked to every three or four hours. Disregarding all my kind-hearted employer's admonitions, I nightly slept on the floor of the hot-house, which was rank with tropical growth. The floor was just the place to inhale the gas, if there had been much to inhale. It did not hurt me, however, and has not yet, and that is a score of years ago. That plants are injurious to health in sleeping-rooms is one of the bugbear assertions that is willingly swallowed by the gullible portion of the community, always ready to assign effects to some tangible cause, and this, as the assertion evinces some chemical lore, is one very prevalent among those disciples of Esculapius who are always willing to be thought learned in the science so intimately connected with their profession.

CHAPTER XXXIV.

NATURE'S LAW OF COLORS.

It has long been a belief among students in vegetable physiology, that, in certain families of plants, particular colors prevail, and that in no single instance can we ever expect to see *blue, yellow, and scarlet colors in varieties of the same species*; yet, undeviating as this law seems

to be, it is astonishing to see the credulity that there is, even among intelligent horticulturists, some of whom believe that we will yet have exceptions to this law, which, as far as all our experience has gone, seems as unalterable as the law of gravitation. If we reflect, we will find there is nothing out of the usual order of nature in this uniformity. The coloring given to the plumage of birds is as unvarying as that given to the petals of a flower in particular families. The most enthusiastic poultry fancier will look in vain for the scarlet plumage of the Flamingo in his Dorkings or Brahmas, or the color of the Baltimore Oriole in the occupants of his pigeon-house. What more reason, then, has the florist to expect that Nature should deviate from her fixed course, and gladden his eyes with a Rose or Dahlia of an azure hue, or that a Verbena or a Petunia should be produced of a golden shade?

A knowledge of this subject is much needed by our amateur horticulturists, who are imposed upon year after year by itinerant dealers, who with flaming colored drawings of these impossibilities in floriculture extract largely from the pockets of their victims, and in addition expose them to the ridicule of their less credulous or more cautious neighbors. The audacity of these scamps is truly astonishing; not a season passes but some of them have the impudence to plant themselves right in the business centres of the city of New York, and hundreds of our sharp business men have for the consideration of $8 or $10, *believed* themselves to be the possessors of veritable blue Roses. Need I say that they were no less humbugged than the rustic who falls into the hands of a mock auctioneer, and chuckles to think that he has become the possessor of a gold watch for a similar price?

In Rand's "Flowers for the Parlor and Garden," page 101, in remarking on the colors of the Verbena, he says a good *yellow* Verbena has not yet been produced, but goes on to say that he, "by a curious process of water-

ing and fertilization with a white Verbena, obtained a seedling which proved on blooming to be of a light straw color; but the plant was *weakly* and *sickly*, and died before cuttings could be taken." This "weakly" and "sickly" condition was exactly why Mr. Rand obtained his straw color; had the plant been in health it, no doubt, would have been only an impure white.

There are few florists of any experience who have not raised hundreds of just such "straw colors" in Verbenas from white, that have been *weak* and *sickly*, for we all know that the want of vitality in the plant imparts a *jaundiced* hue to white flowers.

It is hardly fair in Mr. Rand to withhold from us what that "curious process of watering and fertilization" was, by which he succeeded in bringing into existence what De Candolle, Lindley, and Loudon, have said can never be. When a man writes a book for the information of the public nothing should be held in reserve; his readers have a right to every "secret" that he may possess connected with the subject, and this reservation of Mr. Rand in so very interesting a matter is tantalizing in the extreme. Who knows but if he had given us the *modus operandi* of his "curious process of watering and fertilization" our Verbena beds would have long since had a golden yellow flaunting side by side with scarlet and blue, or that the same "*curious* process of watering and fertilization" applied to the Rose, would have produced a color rivalling a blue-bird in April?

It is much to be regretted that Mr. Rand's yellow Verbena was lost, but we trust that the "curious process" by which it was produced is not among the lost arts. If an application of it can be made to produce a positively yellow Verbena, the gentleman will receive the honors of the whole horticultural world, and, if he chooses, can pocket some thousands of dollars.

CHAPTER XXXV.

PACKING PLANTS.

As commercial floriculture is now becoming a matter of importance, it will be interesting to many of our readers to know the modes of packing for shipment. During February, March, April, and May last, (1873) it is estimated that ten tons daily were received at the different express offices in New York, of the products of the green-house only. These were to be distributed throughout the length and breadth of the land, shipments being successfully made to the most extreme points in every direction. The system of packing adopted for even the most distant orders is of the simplest kind, differing entirely from that in use by the English or French, and is a result, like many other of our operations, of the necessities forced upon us by the want of labor. By our system of packing, we ship plants almost every day from January 15th to June 15th, throughout the coldest weather in winter and the sultry days of summer, with hardly a case of injury, either from freezing or by heat. For the cold season we use close boxes, placing a layer of 4 inches of soft, dry hay on the bottom ends, sides, and top of the box. Whenever the ball of roots is sufficiently firm, the plant is taken from the pot, and each plant wrapped in paper, or rather the ball or root of the plant is wrapped, leaving most of the top uncovered. This wrapping in paper not only serves to keep the ball from breaking, but it also, to some extent, prevents the pressure of the plants upon each other. In packing the plants in the box, they are placed compactly in layers, alternated with an inch or two of soft hay until the box is full. The utmost care is necessary to pack the box entirely full, so that no movement can take place ir the plants should the boxes be roughly handled. The soil should be always rather dry than otherwise, as packed in this close manner the plants will not suffer

for want of moisture. Boxes of medium size are best; we never like to use a box of greater capacity than the ordinary flour barrel, usually prefering such as are one-third smaller than that. If the box is too large, the plants may be injured by mutual pressure.

This is our method of packing as long as there is danger from frost, or until the middle of March. From the middle of March to the middle of April, we use a box of a different character, open on all sides to admit air, for now the danger to be avoided is from heat and not from cold. The manner of packing is in all other respects the same, except that no more hay is used around the inside of the box than necessary to make a soft bed for the plants. If the closely packed plants have any tendency to generate heat, it will be counteracted by the admission of air through the openings in the box. Again, we gradually make a change in our style of packing to suit the advancing season. For small orders, a light kind of chip basket is used, in which the plants are packed in the manner above described, and strapped over the top with hay. We find a basket a most convenient and satisfactory article to pack in, as its open-work sides freely admit the air. In baskets weighing less than two pounds, we pack from 100 to 150 plants. Being annoyed at having frequently to pay for clumsy, heavy packages in which our new importations were received from England, I took occasion to send over to a London nurseryman some fifty plants packed in one of these baskets, the whole basket and contents weighing only 15 lbs., and with two exceptions every plant was received alive. I implored the gentleman to pack the plants he was to send me in return in similar light baskets, as it would not only save freight but, what was of far more importance, save me the plants alive. He sent them in baskets, sure enough, each one weighing of itself 40 lbs., —a shapeless, ponderous affair, that with its contents required two men to lift it into a wagon. This was not the

worst of it; three-fourths of the plants were dead—our usual experience in shipments of plants from Europe. This loss is, without doubt, in most cases occasioned by the cumbrous manner of packing.

When the weather becomes settled, so that all danger of plants being chilled is over, we change our mode of packing the plants from laying them down to standing them upright in the baskets or boxes, beginning with the heaviest plants at the bottom of the box or basket, and placing each succeeding layer, to the depth of three or four, one ball of roots on the top of the other. *After* packing, the box or basket is watered freely, each plant, or at least a portion of it, is exposed to the light, and thus packed, they will remain ten or twelve days without injury.

CHAPTER XXXVI.

PLANTS BY MAIL.

Our postal laws admit plants, seeds, and bulbs, to be sent at the cost of two cents for four ounces, provided the package does not exceed four pounds in weight. This arrangement has been the means of sending seeds and plants into regions where they would not for many years have been procurable with other means of conveyance, and the projector of the idea deserves the gratitude of the nation for it. A number of different contrivances have been invented for packing plants to go by mail, including boxes of various styles and dimensions; the main difficulty with all that we have seen is the weight. Of late years we have dispensed with boxes of all kinds, and pack in the following manner. Having selected the plants, choosing such as are small but well rooted, the soil is washed from

each plant, leaving the fibres of the roots uninjured. A layer of *dry* moss half an inch thick is then spread on two or three thicknesses of thick brown paper; the plants are then laid on the moss, a similar layer of moss is laid over the the roots, and the paper, moss, and plants, are *tightly* rolled up. The dry moss absorbs the water from the dripping roots, so that thus tightly enclosed, sufficient moisture is enveloped in the packages to keep the plants safe for a week, provided that the package has been firmly wrapped up. Either additional paper, sufficient to keep in the moisture, or oiled silk, should be used for the outer covering. This process is so simple that any lady may transmit to another some favorite plant or cutting, a distance of 2,000 miles, if necessary, at little cost. Where moss is not procurable, raw cotton will answer the same purpose; the only danger to be avoided is in rolling up the package too loosely, in which case the dry air will penetrate and will be likely to shrivel up the plants. No injury will result to the plants by tight wrapping, provided cotton or moss has been placed above and below the roots in sufficient quantity.

CHAPTER XXXVII.

THE PROFITS OF FLORICULTURE.

It is much easier to estimate the profits of the product of the soil, be it in fruits or vegetables, than to define by any certain rule what the profits of our green-house floriculture are. In fact, we can only approximate to it, because the conditions in which the operations are carried on at different places, or the different articles grown, make anything like a general average for the whole country im-

possible. But, as we have heretofore done, we will confine ourselves to the district of New York, which may be taken at the present time as a fair representation of the whole country.

The capital required in starting this department of horticulture I consider need not be so much as in that of either nursery, vegetable, or fruit growing, and the chances of moderate success I believe, from my observations, to be far greater. I say moderate success, for the chances of making a colossal fortune in this are by no means so great as in the regular nursery business, while to offset this the chances of failure are less, and the business is pleasanter and less exhaustive to follow. I have hardly ever known a man who started in the florist's business to fail, unless he brought failure on himself by his own imprudence; while I have known scores to fail in the vegetable and nursery business, from causes entirely beyond their control. A frugal man, with a knowledge of the business and $1,000 capital, may safely start in this vicinity, or in any vicinity where there is a town of 10,000 inhabitants of average intelligence and culture. But the difficult question with all at starting is how to make that $1,000 best available. Of course expensive erections, such as we have described in the chapter on green-house structures, are beyond his means, and something cheaper must be adopted. The general principle on which these green-houses are formed is in all respects the same, and the beginner with limited means, instead of erecting three houses, need erect only one, which should not be more than 50 feet long and of a width of 11 feet in the clear. The proportions of height, &c., will be found in the drawing on page 57. The sides may be formed of cedar or chestnut posts planked to the required height, having a lining of tarred paper between the boards. In this way, at present prices, a structure of this kind with flue, benches and all complete need not cost more than six or eight dollars

per running foot, or $300 or $400 for a house of 50 feet. But something else will be needed besides the house, and sunken pits or cold frames should be erected parallel with the *east* side of the green-house and connected with it. A portion, say half, of these, should be excavated to the depth of 2 feet, and used as a sunken pit for Roses, &c., as described in the chapter on Roses; the cold frame portion, which is not sunken but made level with the soil, can be used to grow the hardier sorts of flowers, as Pansies, Daisies, Pinks, &c. I here again repeat that the Rose, unless grown to force for winter flowers, is easily injured by fire heat, which it must necessarily receive if placed in the green-house, in which are grown a variety of plants that require fire heat.

These pits and cold frames should be covered up carefully, either with shutters or mats, during severe weather in winter, and care taken that all water is thoroughly drained off from them. These sunken pits and cold frames of 25 feet each will cost say $100, which, together with the purchase of stock and coal to last through the winter, would make the expenditure to this date, November, $600 or $700, leaving $300 or $400 for expenses in winter, or until sales open in spring. If the plants have been handled with even average skill, the sales should by June give a profit of at least 50 per cent on the capital invested, supposing the plants to be sold at the average retail rates.

I am not prepared to say what the profits on the capital invested are when business is done on a large scale, the articles grown, the manner of selling, and economy of management, being so varied that in this, as in all other occupations in life, we have all degrees of success. But the broad fact is beyond question that the profits of the business will compare favorably with the general run of business in which the same capital is invested.

One fact, very flattering to our florists in this country

is, that although our plants on an average are sold lower than they are in England, and our new plants at less than one-fourth of the prices obtained there, the business is more profitable here than there. Why is this? the reader may doubtingly ask. Simply that our necessities with regard to labor compel us to apply our common sense to the work, and we cut loose from many of the established rules with which English florists are yet stupidly trammelled.

In two of the leading London establishments, having each about 50,000 feet of glass, the average number of hands employed during the year is fifty. The same quantity of glass would be worked here in a style quite equal to theirs, as far as the quality of the plants goes, with less than one-third of that number. I am informed by a gentleman who was for many years connected with one of these English establishments, that the profits did not exceed 10 per cent of the sales. I am afraid that the smallest operator of us all here would soon quit the work if it gave no better results.

What is true of the florist's business I believe to be equally true of the nursery trade, and it is much to be doubted if that business anywhere in all Europe is so simply yet profitably carried on as it is in the great nurseries of Rochester and Geneva.

CHAPTER XXXVIII.

HOW TO BECOME A FLORIST.

I am often asked the question if it is necessary in order to become a florist to enter some large establishment for a few years, or whether it is possible to learn from reading only. I reply, if it can be afforded, it will be best by all means to serve at least two years in

some well-conducted establishment—one that has been long enough established to have made the business a success, for the best index of ability in any business is success. I have said, if it can be afforded, as for the first two years, unless a youth prove himself unusually smart, he will not likely receive more than enough to pay his board, for he is simply an apprentice under instructions, who has come with the design of leaving when he has acquired a knowledge of the trade, and just at the time that he begins to be of use to his employer.

But to those to whom it would be inconvenient to place themselves thus under instructions, a knowledge of the business could be unquestionably obtained from books, particularly if actual practice were followed conjointly with the reading. There are upward of a hundred of my patrons (about one tenth of whom are ladies), located in nearly every State of the Union, who have worked themselves into the florists' business exclusively by reading and their own practice, having had no opportunity for other instruction. In not a few cases some of these have got ahead of what is known as professional gardeners, those who have had no other experience than that received in private gardens in Europe, which by no means fits them for the American style of commercial floriculture. The increase of taste for flowers for the past twenty years has been truly wonderful. A gentleman who has a turn for statistics in this particular line, informed me that he had begun to procure information from all parts of the country of the numbers engaged in the trade together with the capital employed. He said that his investigations for this locality, taken in the rough, extending in a radius of ten miles from the center of New York Island, proved that the number of florists' establishments was about five hundred, and the capital used in stock and structures upwards of $6,000,000. If the number of establishments is nearly correct—and there is no reason to doubt it—I

am certain that the value is not overestimated, as we have at least half a dozen establishments where the capital used in stock and buildings must be nearly $100,000 each. And this, too, in New York and its suburbs, where the taste is lower than it is in either Boston or Philadelphia. In those places, no doubt, their excellent horticultural societies have done much to refine the tastes of the people, and it is to be regretted that neither New York nor its adjacent cities, with probably over two millions of people, have a single horticultural or floricultural society.

CHAPTER XXXIX.

SHORT DESCRIPTIONS OF SOFT-WOODED OR BEDDING PLANTS OF THE LEADING KINDS.

Antirrhinum majus, (Snap Dragon), now comprises varieties of all shades and markings; in colors of yellow, white, crimson, scarlet-orange, rose, etc. A dwarf style does not exceed six inches in height. Grown from seed or cuttings.

Bouvardia triphylla. — An orange-scarlet, summer-blooming variety. See Winter-Flowering Plants.

Begonias.—See Winter-Flowering Plants.

Calceolarias, Shrubby.—Plants blooming from June to October in the open ground; colors ranging from light yellow to deep crimson. Grown from seed or cuttings.

Calceolarias, Herbaceous.—These are grown from seed sown in August or September, and when well grown, form plants of great beauty and interest for the greenhouse, in April and May. Their pocket-like flowers are finely spotted, and embrace a great range of color. Plants of the dwarf varieties do not exceed one foot in diameter, and are favorites with all lovers of flowers.

Canna Indica, and varieties. — Plants of majestic growth, well adapted for grouping on lawns. The roots

are dug up in fall, and kept as we preserve Dahlias. Propagation, division of the root or by seeds. See p. 86.

Carnations, Monthly.—These, when planted out, bloom profusely from July to November. See Plants for Winter-Flowering.

Cinerarias.—The treatment is the same as for Herbaceous Calceolarias, to which they form an excellent contrast as green-house ornaments in spring.

Coleus Verschaffeltii and others are grown as bedding plants for their foliage only. There are now scores of varieties, all of which require a temperature in winter of not lower than 60°; with less than that there will be much difficulty in keeping them. Being tender, they should not be planted out for bedding purposes until the weather has become settled and warm. Propagation by cuttings.

Caladium esculentum.—A plant with enormous shield-shaped leaves, which often measure 30 by 20 inches. The plant attains a height of 5 or 6 feet, and is a striking object when planted on a lawn. There are numerous other Caladiums with beautifully shaded and spotted leaves, grown as stove plants.

Chrysanthemums, Chinese.—These consist of three classes, the *Large Flowering*, the *Pompone or Bouquet*, and the *Japanese.*

There is no plant that we cultivate, with the exception perhaps, of the Dahlia, that assumes such an extended range of color—crimson, orange, yellow, pink, white, carmine, and purple, being blended in every conceivable shade. Cuttings planted out in May will produce, by topping, large, bushy plants that will bloom in October; they are entirely hardy in this latitude, and will stand with slight covering, which should be put on late in fall, say December 15th, in the extreme Northern States. They are often lifted and potted in fall, and form handsome green-house or parlor plants until December.

Delphiniums, or Larkspurs.—The perennial varieties of

these can nearly all be used as continued summer-blooming bedding plants, if the seed is sown in a hot-bed or green-house in February, and the plants put out in the open border in May. Their great value consists in their rare shades of blue, a color always scarce in flowers. Well-known varieties are *D. bicolor grandiflorum,* and *D. formosum,* both have a deep mazarine blue ground, with distinct spot in the centre of each floret. All the perennial species and varieties are hardy. To these may be added *D. nudicaule,* a new fine red dwarf species.

Dahlias.—The climate of the Eastern and North-western States is better adapted to the early development of the flowers of the Dahlia than warmer latitudes, and thus we find that though the frosts occur here earlier in fall, yet the season of flowering is of longer duration than in districts where the fall frosts are later in coming; hence the climate of Boston or New York is better for Dahlias than that of Baltimore or Washington. The perfection that is attained, both in form and color of the Dahlia, is now wonderful. They are divided into four classes, namely:

Bedding.—Dwarf, profuse-flowering sorts, that are pruned down so that they do not exceed a foot in height.

Bouquet or Pompone.—The flowers of many of these do not exceed 1½ inches in diameter, and are perfect models in form.

Exhibition or Show.—The large-flowered, self-colored, or tipped varieties.

Fancy.—The striped or speckled kinds.

Dahlias are propagated by division of the tuber, or (as done by florists) by cuttings. Plant out when all danger of frost is over, in rich soil 3 or 4 feet apart, thin out superfluous shoots, and tie to strong stakes; lift in fall when cut down by frost, and keep in a dry, warm cellar, or under the stage of a green-house, only in such a position

that they will not be dried too much. Amateurs, to be safe, should first dry them well, and then pack them in boxes in dry sand.

Fuchsias are the most graceful of all cultivated plants. Nothing, in our opinion, can surpass the beauty of well-grown specimens. They are of the easiest culture; plants rooted from cuttings in January can be grown with ease to 6 feet in height in June, by due attention to repotting as the plants make root. When grown as specimens, at least half the soil should be rotted cow manure or rotted refuse hops. They are also well adapted as bedding plants for the flower-garden, in cool and partially shaded situations. The dark-flowered varieties are best fitted for bedding. There are also a few winter-flowering sorts described in chapter on Winter Flowering Plants. One of the most beautiful of the newer varieties, "Day Dream," is very popular.

Geraniums, botanically speaking, are nearly all hardy, herbaceous plants, a short list of which will be found under that head; but Geraniums *popularly* known as such are those that are about to be described, and we believe that a large majority of our readers will agree with us in using the popular name, rather than the botanical one of Pelargonium.

Geranium, Zonale.—This is perhaps the best known type of the class, so called from the leaves of many of the varieties being marked with a dark band or zone. This is the bedding plant, par excellence, of the easiest propagation by cuttings, always healthy and of free growth in almost all soils and situations, blooming in summer from June to October, and, if desired, it will continue its flowering in the green-house to June again. The varieties are endless, ranging in every shade of white, rose, crimson, scarlet, carmine, &c., &c. At the present time there are hundreds of double varieties, comprising

all the colors; but there is little doubt that a short time will give us double sorts of all the shades we have in the single. A striped variety of L' Incomparable was produced in 1867.

Geraniums, Variegated-leaved.—These are divided into five classes, namely, "Golden margined," "Silver margined," "Golden tricolor," "Silver tricolor," and "Bronzed."

Golden Margined.—This class, of which the variety called "Golden Belt" is the type, has the margin of the leaf golden yellow to one-third its depth, with occasionally a dark zone, the part of the leaf toward the footstalk being green. The flowers of this class are usually scarlet or crimson; they are good bedders in cool soils.

Silver Margined. — These are generally of strong growth, equal to the Zonale. One of the finest of this section is the Mountain of Snow, a variety having half of the leaf nearly white, with large trusses of bright scarlet flowers.

Geraniums, Golden Tricolors.—These are grown almost exclusively for their leaves, which in their wonderful beauty are triumphs of horticultural art. The bands of yellow, crimson, orange, and carmine, on a ground-work of green, rival, while they somewhat resemble, the tints of the rainbow. A well-known and beautiful type of this class is the variety Mrs. Pollock; this, in our grounds, has grown vigorously in the open border for the past two seasons.

Geraniums, Silver Tricolors.—These are belted with white, carmine, and crimson, on a green ground, forming a beautiful contrast to the preceding. A well-known type of this class is "Moonbeam."

Geraniums, Bronze-leaved.—An unique class, having the ground color of the leaves yellow, with a dark red or brown zone. The flowers of most of these are scarlet, and

are borne in great profusion. About the finest of this section is known as Golden Model.

GERANIUMS, IVY-LEAVED.—Of these there are now many beautiful varieties. They are all climbing or trailing plants, some of which, Peltatum elegans, for example, have glossy green, wax-like leaves, with a black zone; others, like the Holly Wreath, have leaves margined with white, as in the *silver margined* zonales. The flowers are borne in large trusses of white, carmine, or lilac. All the class are well adapted for baskets or for trellis work.

GERANIUMS, SCENTED-LEAVED.—These embrace plants of widely different appearance, such as "Apple," "Lemon," "Citron," "Rose," "Peppermint," and "Nutmeg-scented," with many others. The rose and lemon-scented are extensively used for mixing with flowers in making bouquets, &c.

Hollyhock.—For extensive grounds this is an exceedingly showy flower. The flower spike attains a height of six or eight feet, covered with flowers to the extent of two feet. The varieties embrace a great range of color—white, scarlet, yellow, orange, crimson, rose, maroon, &c.—many having these colors curiously blended. The Hollyhock seeds freely from double flowers, the colors in almost every case coming true from seeds. Seeds are to be sown when ripe in September, and the plants, if slightly protected by covering with hay or leaves, will bloom profusely the next season.

Heliotropes.—These comprise but little range of color, being mostly shades of lilac and blue, some of the newer sorts, however, being nearly white. What they want in gaudiness of color, they well compensate for in their delicacy of fragrance. The varieties are numerous, but many of them are not very distinct. Those forming the greatest contrast are Boule de Neige (blush white), and Purpurine, (dark violet.)

Lemon Verbena (*Aloysia citriodora*) is largely grown for the fragrance of the leaves, which are indispensable as a "green" in summer bouquets. The plant is deciduous, (losing its leaves in winter), and may be kept under the stage of the green-house, or in the cellar during winter. The Lemon Verbena makes a highly ornamental plant when grown like a standard Rose, that is, by allowing only one shoot to grow to a height of five or six feet, then permitting it to branch out at the top.

Lantanas.—These require more heat, to keep them in good condition during the winter, than do most bedding plants, and for this reason are not so common as many others less worthy of cultivation. The colors are orange, yellow, pink, scarlet, crimson, and white, blending and changing to a remarkable degree. Often different flowers growing on the same plant will be entirely unlike. Plants from cuttings set out in May or June attain a diameter of four or five feet by fall, blooming profusely throughout the entire summer and fall months.

Lobelia gracilis, and its varieties, are all low-growing plants, mostly with blue and white flowers, though some of the varieties of later date are lilac or rose color. They are admirably adapted for the front lines of "ribbon borders," and for hanging baskets or vases; they bloom profusely from June to November, and may be easily kept as parlor plants, if desired.

Mimulus luteus (or Monkey Flower) comprises numerous varieties, with white, sulphur, and yellow grounds, beautifully spotted with crimson, scarlet, pink, &c. They luxuriate in damp, shady situations, and bloom profusely during the early summer months. A double variety, called Hose-upon-hose, is a very remarkable sort.

Mimulus moschatus (Musk Plant), is grown for its odor of musk, which the leaves have in a marked degree. Flowers yellow.

Pentstemons, (Hybrids).—Plants yet comparatively little known. The plant in general appearance somewhat resembles the Antirrhinum (or Snap Dragon) but assumes an entirely different range of color, the flowers being carmine, violet, crimson, vermilion, and other shades of red, with a distinctly marked white throat in most of the varieties. They bloom throughout the summer months, and may be kept with half hardy plants in a cold frame in winter.

Petunias, (double and single) are now so well known that a description is hardly necessary. The single varieties, when wanted for bedding, make finer plants if raised from seed sown in January and February than from cuttings. The double varieties, of course, are mainly raised from cuttings, but are more used by the florists as pot plants than for bedding purposes, as they flower less profusely and are generally less showy than the single sorts.

The most valued of the single sorts are those with white grounds, marked with crimson blotches or stripes; those of the double, with crimson ground with white-edged petals. There are numerous varieties kept to name, but the majority of them are of only local interest.

Pinks, Florist's.—Hardy, evergreen, herbaceous plants, blooming in June. The prevailing colors are maroon, crimson, rose, and white. They are much used in their season for summer bouquets, the flowers keeping well, besides being all of a rich clove-scented fragrance.

Pinks, Mule.—Similar in general character to the preceding, but having smaller flowers, entirely distinct in form and color. The varieties are few, and are known as the crimson, rose, white, and striped sorts.

Pyrethrum Golden Feather.—A new plant, a "sport" from the well-known *Pyrethrum Parthenium*, or Feverfew, having leaves, as the name indicates, of a golden shade. For baskets during winter or spring, or for a ribbon

line plant, to contrast with Coleus or Achyranthes during the spring or fall months it is valuable. It, however, loses its rich shade of yellow during the hot weather, which rather mars its utility for bedding purposes.

Pelargoniums.—If I was confined to grow but a single genus of plants for conservatory decoration, the Pelargonium would be chosen. Nothing can exceed the richness of coloring of the flowers; an attempt to describe it would be a failure. They are classed as "show" and "fancy" varieties. The "show" are the strong-growing and large-flowered section; the "fancy" are those with smaller leaves, dwarfer growth, and flowers of smaller size, but having the property of flowering later in the season than the others. The colors of the Pelargonium are carmine, vermilion, orange-crimson, blackish-maroon, and white, so disposed in many varieties as to resemble the work of the painter, rather than the work of nature. To be grown in perfection they should be shifted into larger pots as soon as the roots begin to mat the outside of the balls, the shoots pinched back until they begin to set their flower buds in March or April, when they must be placed close to the light, and never allowed to wilt for want of water. Plants struck from cuttings in January may be grown to a diameter of 2 feet by May, but for specimens of extra size, plants a year old are necessary. They should be kept in pots and under glass during summer, as they are very liable to injury from continued rains.

Stocks, Intermediate, crimson and white. Seed of these sown in September, and potted in October, shifting as necessary through the winter, will make fine plants, to bloom in May. These may be planted out in the open border, and will continue in bloom until July. Ten Week's Stocks are also effective as border plants, and may be sown in the hot-bed in March and planted out in May. The variety of these is now very large.

Salvias, (Scarlet and Blue Sage).—No plant that is used for the flower border holds a higher reputation amongst amateurs than these, particularly the former. Its bright scarlet, feather-like plumes are unrivalled from July to October, and in warmer latitudes continue for months later. It is best raised from seeds sown in the green-house or hot-bed in March and planted out in May. The blue sage (*S. patens*) seeds very sparingly, and is generally raised from cuttings. Its shade of blue is unsurpassed by any flower of the garden, but the flowers drop quickly and it never shows the density of spike of the scarlet sorts. A fine white variety was introduced last spring.

Tuberose.—See special chapter.

Tropæolum. Hybrids. (Nasturtiums.)—The dwarf sorts of these are very desirable, blooming without intermission from June to October. The scarlet varieties, in particular, are exceedingly showy; when grown on poor, dry soil or among rocks they show to much better advantage, as rich soil causes them to produce leaves so abundantly as to hide the flowers. They are for this reason well adapted for vases, as they stand heat and drought well. There are some beautiful yellow varieties marked with crimson; also some of a dark maroon, almost black, but, as we have before said, the bright scarlet sorts are most desirable.

Violets.—See special chapter.

Verbenas.—See special chapter.

Zinnias, Double.—Although these are now common enough as annual plants, their great value as ornaments for the flower garden deserves brief notice. To have them develop in perfection they should be sown under glass in March or April and planted out in May. The first flowers usually do not come double, but towards the end of summer, if the seed be of a good "strain," flowers will be produced rivalling the Dahlia in symmetry, and of varied and novel shades of coloring.

PROPAGATING SOFT-WOODED PLANTS IN SUMMER.

The following, which appeared in the American Horticultural Annual for 1868, may be appropriately introduced here:

Every one who has attempted the propagation of plants by cuttings during the high temperature we have in the months of July and August, is aware of the great difficulty experienced in doing so, no matter what system or process is resorted to. In those months plants of a succulent nature, such as Carnations, Geraniums, Petunias, etc., etc., grow rapidly, and the shoots formed are in consequence watery and soft, so that, when detached from the plant and used for propagation at that hot season of the year, when the thermometer will average 75° or 80° in the shade, the chances are that few will root, but will, as gardeners term it, "damp off" in a few days after being put in as cuttings. In ordinary cases, with those having the means of propagating plants, this difficulty in rooting cuttings during the summer months is not of much importance, as florists usually reserve stock enough to enable them to produce all the cuttings they require at the proper season for propagating, namely September, October, and November. But with amateurs, who have but a plant or two of some favorite variety and who wish safely to increase it, or to the florist wishing to make the most of some valuable importation, this (to us) new practice is likely to prove of some benefit. The increasing taste for the new kinds of variegated Pelargoniums induced us to import a number of the tricolor section, of which the now comparatively well-known sort Mrs. Pollock is a type. These we found to grow rather slowly, and to increase them to the best advantage became a matter of consideration. Layering in the usual way, by bending them down to the ground, was, of course, in plants of that style of growth, all but impracticable. To have taken off cuttings would have

not only farther enfeebled already feeble plants, but the prospect of rooting these cuttings in hot weather was nearly hopeless; so a compromise was decided on, which, for want of a better term, we call "layering in the air." As shown in figure 69, the shoot is "tongued" in the

Fig. 69.—MANNER OF TONGUING THE GERANIUM.

manner of an ordinary layer. This has the effect to arrest the upward flow of the sap at the incision, which, of course, acting to some extent as if the shoot had been taken off, induces a branching out *below* the "layer," providing shoots for further operations. But the effect on the vigor of the plant is much better than if the layer or shoot had been detached; for, by the time it takes to get hardened and form a callus, the shoots branching out below the cut are fit to supply the loss of foliage sustained when the

layer or cutting is detached. The cutting or "layer" is in condition to be cut off in five or six days from the time it has been tongued, and will be found not only to be healed up, and in such a condition that it will quickly emit roots, but the whole cutting presents a well-ripened, firm condition, not easily described, but readily detected by the practical propagator. When detached, they should be treated in all respects as ordinary cuttings, duly watered, and shaded for a few days until they strike out roots, when they are potted off in small pots in the usual manner. During the unprecedently wet summer that we had in 1867, we found that many of the plants of the variegated Pelargoniums and variegated Rose Geranium "Lady Plymouth," operated on in this manner, produced roots half an inch in length, as they hung in the air; but this was of no special advantage, as we found that those that merely healed up and callused made just as fine plants as those that had formed roots before being cut off.

Plants thus formed make much finer plants than regular layers, as they are to all intents and purpose cuttings, and consequently, unlike layers, are not long dependent on the parent plant for support, being indebted little or nothing to the old plant during their development. By this system of propagation we have had the satisfaction this season of doubling our stock of many rare and valuable plants, which it would have been perfectly impracticable to do in the usual manner during the hot months.

CHAPTER XL.

WHAT FLOWERS WILL GROW IN THE SHADE?

The question "What flowers will grow in the shade?" is put to me every spring by scores of city people, whose little patch which they wish to devote to flowers is so walled up by neighboring houses, that the direct rays of the sun never touch it. But few plants will develop their flowers there, and none will do it so well as if it were lighted up by sunshine a part of the day. Fuchsias, Pansies, Forget-me-nots, Violets, Lobelias, Lily of the Valley, Phloxes, and other herbaceous plants whose native habitat is a shady wood, will do best, but even these languish if denied all direct sunlight. The best effect in such situations is produced by ornamental-leaved plants, the beauty of which is not dependent upon their flowers. Among these may be ranked the Gold and Silver Variegated-leaved Geraniums, Achyranthes, Alternantheras, Begonias, Caladiums, Centaureas, Coleuses, etc., which, if planted so as to bring the various shades in contrast, produce a pleasing effect, which continues during the entire summer months, and is not surpassed by any display of flowers.

The cultivator of flowers in rooms should understand the necessity of sunlight to plants that are to flower, and endeavor to get these as close as possible to a window having an eastern or southern aspect. The higher the temperature the more plants suffer for want of light. Many plants might remain in a temperature of 40°, in a cellar for example, away from direct light, for months without material injury, while if the cellar contained a furnace keeping a temperature of 70°, they would all die;

such would particularly be the case with plants of a half-hardy nature, such as monthly Roses, Carnations, Fuchsias, etc.

In our green-house culture of flowers, direct sunlight is an all important consideration; and a spell of sunless weather in midwinter is often a loss to us of hundreds of dollars by preventing the development of flowers. Hence, we use every means at command to dispose the plants to secure the greatest amount of light.

The debilitating effects of want of direct light on plants are well illustrated by taking a vigorous plant in full foliage and flower, that has been growing in the direct light of our green-house benches, and placing it under the bench. If the temperature is high—say 70° in 48 hours, the sickly signs, showing want of light, will be apparent to an experienced eye; in a week its condition would be such as to indicate sickness to the most common observer, and in a month it would most likely be dead.

In this respect there is some analogy between plant and animal life, and it teaches us the importance of light for our own healthy development. Certain it is that our green-house and garden operatives will compare favorably with any other class of workmen, as far as health is concerned. In the past twenty years I have had an average of thirty workmen daily. During that time but one has died, and two only have been seriously sick, and some three or four veterans who are growing gray in the service, have never lost an hour by sickness. I doubt if it would be easy to find the same number of workmen employed *out of the sunlight*, who could show such health as these sunbrowned boys of ours.

CHAPTER XLI.

GREEN-HOUSE AND STOVE, OR HOT-HOUSE, PLANTS.

SELECT LIST OF GREEN-HOUSE PLANTS.

The following list includes plants which should be kept at a night temperature ranging from 40 to 50 degrees. For a more extended list, see special green-house catalogues.

Abelia floribunda.
" rupestris.
Abutilon Santana.
" insigne.
" Mesopotamicum.
Achyranthes Verschaffeltii.
" Gilsonii.
Acacia angustifolia.
" armata.
" pubescens.
Achimenes Boothii violacea.
" coccinea superba.
" elegans.
" grandiflora.
" pedunculata.
" Wagnerii.
Agapanthus umbellatus.
Agave Americana.
" " variegata.
Antirrhinum (Hybrids in var.)
Alonsoa elegans.
Aloysia citriodora.
Ardisia crenulata.
" " alba.
" serrulata.
Artemisia argentea.
Azalea Indica.
Asclepias curassavica.
Beaufortia decussata.
Babiana, of sorts.
Bignonia jasminoides.
" " rosea.
" alba.
Bouvardia compacta.
" Laura.
" leiantha.
" " splendens.
" " floribunda.
" " grandiflora.
" longiflora alba.
" " rosea.
" Hogarth.
" triphylla.
Brugmansia Knightii.
Burchellia capensis.
" speciosa.
Cereus flagelliformis.
" grandiflorus.
" Smithii.
Calla (Richardia) Æthiopica.
" " " nana.
Camellia Japonica (and Hybrids).
Canna discolor.
" Indica.
" Van Houttii.
Centaurea candidissima.
" compacta.
Cestrum aurantiacum.
" laurifolium.
Chorozema cordata elegans.
" varia.
Cineraria maritima.
" amelloides and Hybrids.
Convolvulus Mauritanicus.
Clerodendron Japonicum.
Clethra arborea.

Clivia nobilis.
Correa alba.
" " delicata.
" speciosa.
Coronilla glauca
" " variegata.
Crowea saligna.
Rochea falcata.
Cyclamen Atkinsii.
" Persicum.
" " album.
" " rubrum
Daphne Indica.
" odora rubra.
" " variegata.
Diosma alba.
Diplacus puniceus.
Dionæa muscipula.
Epacris Alteanii.
" coccinea.
" Cunninghamii.
" delicatissima.
" densiflora.
" grandiflora.
" " rubra.
" impressa.
" " carnea.
Epiphyllum elegans.
" formosissimum.
" speciosum.
" truncatum.
" " Atkinsii.
" " violaceum.
Erica lævis.
" ventricosa.
" Willmorei.
" gracilis.
" persoluta.
" " alba.
Erythrina Crista-galli.
" herbacea.
Eugenia myrtifolia.
Eucharis Amazonica.
Eupatorium elegans.
" fruticosum.
Fabiana imbricata.
Ferraria antherosa.
Fuschias (Hybrids in variety).
Gardenia florida.
" radicans.
Gardoquia Hookerii.
Geranium (Hybrids in variety).
Gazania splendens (and Hybrids).
Heliotropium corymbosum (and Hybrids in variety).
Hydrangea Hortensia.
" Japonica.
" " var.
" deutzifolia.
Indigofera decora.
Inga pulcherrima.
Jasminum grandiflorum.
" Sambac.
Justicia carnea.
Kennedya ovata.
" " alba.
" Marryattæ.
Lachenalia quadricolor.
" superba.
" tricolor.
Lantana Adolphe Haas (Hybrids)
" aurantiaca superba.
" ne plus ultra.
" lutea carminata.
" Md. Reudatler.
" rubra lutea.
" xanthina superba.
Lapageria rosea.
Lechenaultia formosa.
Libonia floribunda.
Lobelia Erinus.
" " speciosa.
Linum trigynum.
Lithospermum fruticosum.
Lophospermum scandens.
Magnolia fuscata.
Mahernia glabrata odorata.
Manettia bicolor.
" cordifolia.
Mandevilla suaveolens.
Maurandia Barclayana.
" " rosea.
" " alba.
Metrosideros robusta.

Mimulus luteus vars.
Myrtus communis.
" " double flowered.
" " variegated.
Nerium Oleander.
Pyrethrum Parthenium pleno.
Passiflora hybrida.
" cærulea racemosa.
Pelargonium (Hybrids in variety).
Ruellia formosa.
Rhynchospermum jasminoides.
Salvia fulgens.
" gesneræflora.
" Liliana.
" patens
" " alba.
" splendens.
Salvia splendens Gordoni.
Senecio maritima.
Solanum capsicastrum.
" " fol. var.
" Pseudo-capsicum.
" " fol. var.
Sollya heterophylla.
Sparmannia Africana.
Stevia serrata.
" " grandiflora.
" compacta.
Tremandra ericifolia.
Veronica Andersoni.
" " variegata.
" Lindleyana.
" splendida rubra.
" imperialis.

ABRIDGED LIST OF STOVE OR HOT-HOUSE PLANTS.

This list comprises plants which should be kept at a night temperature ranging from 55 to 65 degrees.

Æchmea discolor.
" fulgens.
Æschynanthus grandiflorus.
" speciosus.
" zebrinus.
Alternanthera amœna.
" spathulata.
" tricolor.
" versicolor.
Allamanda cathartica.
" Schotii.
Alocasia metallica.
" argyroneura.
" Bataviensis.
" Lowii.
" Javanicum.
Anthurium grande.
" regale.
Aphelandra aurantiaca.
" grandis.
Aralia leptophylla.
Ardisia crenulata.
" " alba.
Begonia argyrostigma.
" coccinea.
" Decaisneana.
" incarnata.
" fuschoides.
" " alba.
" Sandersoni.
" marmorata.
" Miranda.
" nebulosa.
" Nigricans.
" Rex.
" splendida.
Bertolonia maculata.
" guttata.
Billbergia rosea.
Bignonia venusta.
Bonapartea juncea.
Bouganvillea spectabilis.
Brexia chrysophylla.
Caladium amabile.
" argyrites.
" Belleymei.

Caladium bicolor.
" Brongniarti.
" Chantini.
" esculentum.
" marmoratum.
" pictum.
" regale.
" Verschaffeltii.
" Wightii.
Centradenia rosea.
" " floribunda.
" " grandifolia.
Cissus discolor.
" argentea.
Clerodendron Balfouri.
" splendens.
Coleus Verschaffeltii.
" Vietchii.
" atropurpureus.
" Blumei.
" " laciniata.
" marmorata.
Combretum purpureum.
Croton discolor.
" elegantissimum.
" pictum.
" variegatum.
Dieffenbachia Barquiniana.
Dracæna Cooperi.
" Draco.
" ferrea.
" maculata.
" spectabilis.
" terminalis.
Dichorisandra mosaica.
Dipladenia nutans.
" picta.
" urophylla.
Eucnaris Amazonica.
Echites amabilis.
" rubrovenosa
Eranthemum leuconeurum.
" rubrovenium
Euphorbia jacquiniflora.
" splendens.
Gesneria bulbosa.
" amabilis.
Gesneria excelsa.
" Herberti.
" hybrida.
" oblongata.
" spendens.
" zebrina.
Gloriosa Plantii.
Gloxinia (Hybrids in var.)
Goldfussia anisophylla.
Goodyera discolor.
Hoya carnosa.
" " fol. var.
" imperialis.
Ipomæa Horsfalliæ.
" insignis.
" Learii.
Ixora blanda.
" coccinea.
" crocata.
Justicia speciosa.
Lasiandra splendens.
Lapageria rosa.
" " alba.
Maranta fasciata.
" sanguinea.
" Warscewiczii.
" zebrina.
Medinilla magnifica.
Monochætum volubile.
Nepenthes distillatoria.
" Rafflesiana.
Passiflora alata.
" Baraquiniana.
" kermesina.
" racemosa princeps.
Philodendron Lindenianum.
Plumbago rosea.
Poinsettia pulcherrima.
Pothos argyræa.
Rogiera amœna.
" thyrsiflora.
" gratissima.
Rondeletia anomale.
" speciosa.
Rhyncospermum jasminoides.
Ruellia formosa.
Russelia floribunda.

Russelia juncea.
Sanchezia nobilis variegata.
Solandra grandiflora.
Sonerilla margaritacea.
Sphærostema marmorata.
Stephanotis floribunda.
Tacsonia sanguinea.
" pinnatistipula.
Tielanthera ficoidea tricolor.
Tillandsia tenuifolia.
Torenia Asiatica.
Tradescentia discolor.
" zebrina.
Tydæa grandis.
" venosa.
Tapina variegata.
Urceolina aurea.

CHAPTER XLII.

ANNUALS, HARDY HERBACEOUS, PERENNIAL AND BIENNIAL PLANTS, ORNAMENTAL SHRUBS AND CLIMBERS.

ANNUALS AND BIENNIALS.

Subjoined is an abridged list of leading annuals and biennials, suited for summer decoration of the flower garden and for green-house culture. For description, see descriptive seed lists.

Alyssum, Sweet (Koniga maritima).
Amarantus sanguineus.
" tricolor.
Anagallis grandiflora.
Aster, German.
Balsam, Camellia flowered.
" Rose.
Calceolaria hybrida.
" " nana.
Calliopsis marmorata.
" Drummondii.
" Atkinsonii.
" mosseux.
Campanula Speculum.
" Lorii.
" media.
Cineraria hybrida.
Clarkia elegans.
" pulchella.
" integripetala.
Collinsia bicolor.
" grandiflora.
Convolvulus major.
" tricolor.
Datura humilis, fl. pl.
" Carthageniensis.
" meteloides (Wrightii).
Dianthus Chinensis.
" Heddewigii.
" laciniatus.
Digitalis purpurea, superba.
Dolichos Lablab.
Downingia (Clintonia) pulchella.
Erysimum Peroffskianum.
Eschscholtzia crocea.
Gaillardia grandiflora hybrida.
" coccinea nana.
Gilia tricolor.
Gomphrena globosa.
Helichrysum bracteatum.

Lupinus hybridus atrococcineus.
" tricolor elegans.
Lychnis Haageana.
Mirabilis Jalapa.
Mimulus maculosus.
" cardinalis.
Mathiola annua, hybrida.
Mimosa pudica.
Nemophila insignis.
" maculata.
Nigella Damascena.
" Hispanica.
Phlox Drummondii.
Portulaca grandiflora.
Reseda odorata.
Rodanthe Manglesii.
Ricinus communis, minor.
Salpiglossis coccineus.
Saponaria Calabrica.
Scabiosa atropurpurea.
" " candidissima
Schizanthus Grahamii.
Tagetes patula erecta.
" signata pumila.
Thunbergia alata.
" aurantiaca.
Tropæolum peregrinum.
" coccineum.
Vicia Gerardi.
Viola tricolor hybrida.
Whitlavia grandiflora.
Xeranthemum annuum.
Zinnia elegans.

HARDY HERBACEOUS PLANTS.

The interest in hardy herbaceous plants is rapidly increasing. Space will permit a list of only a few of the most showy and interesting kinds.

Achillea tomentosa.
" Ptarmica-pleno.
Aconitum Napellus.
Adonis vernalis.
Alyssum saxatile.
" " fol. variegatis.
Auchusa Italica.
Anemone Japonica.
" " hybrida.
" vitifolia.
" " alba.
Aquilegia alpina.
" Canadensis.
" Durandii, flore-pleno.
" glandulosa.
" Skinneri.
Arabis albida.
" " fol. variegatis.
Arundo Donax.
" " variegata.
Asclepias incarnata.
" tuberosa
Asphodelus luteus
Aster discolor.
Astilbe Japonica.
" " variegata.
Baptisia australis.
Bulbocodium vernum.
Campanula alpina.
" Carpatica.
" garganica.
" " alba.
" grandiflora.
" latifolia.
" nitida alba.
" persicæfolia.
" versicolor.
Catananche cœrulea.
Centaurea dealbata.
Centranthus ruber.
Cerastium tomentosum.
Chelone glabra.
" integrifolia.
Colchicum autumnale.
" " album.
Comaropsis fragarioides.
Convallaria majalis.
Convolvulus Mauritanicus.

Coreopsis grandiflora.
Cornus Canadensis.
Coronilla montana.
Corydalis bulbosa.
" cava lutea.
" nobilis.
Crucianella stylosa.
Cypripedium acaule.
" spectabile.
Daphne Cneorum.
Dactylis glomerata.
Delphinium Barlowii.
" Belladonna.
" bicolor grandiflorum.
" elatum plenum.
" formosum.
" giganteum.
" Hendersonii.
" pulchellum.
Dianthus deltoides.
" Verschaffeltii.
Dictamnus Fraxinella.
" " alba.
Dicentra spectabilis.
" " alba.
Dodecatheon Meadia.
Epimedium alpinum.
" macranthum.
Epipactis latifolia.
Eryngium amethystinum.
Erythronium Americanum.
" Dens-canis.
Eupatorium ageratoides.
" purpureum.
Euphorbia amygdaloides variegata.
Funkia grandiflora.
" lancifolia.
" Sieboldiana.
Galium boreale.
Gentiana acaulis.
" Bavarica.
" Fortunii.
" purpurea.
" verna.
Geranium affine.
" argenteum.
" Lamberti.
Geranium Lancastriense.
" pratense.
" " flore-pleno.
Geum Chilense atrosanguineum.
Gnaphalium margaritaceum.
" orientalis.
Gynerium argenteum.
Gypsophila acutifolia.
" repens.
Hedysarum coronarium.
Helleborus niger.
" viridis.
Hemerocallis flava.
" graminea.
Hepatica triloba alba.
Hesperis matronalis alba plena.
Hieracium aurantiacum.
Hypericum nummularium.
" tomentosum.
Iberis saxatile.
Iris alata.
" Attica.
" bicolor.
" cristata.
" elegans.
" flavescens.
" formosa.
" livida.
" odorata.
" pumila alba.
" Susiana.
" versicolor.
" Virginica.
Lamium molle.
Lathyrus grandiflorus.
" latifolius.
" tuberosus.
Lepachys (Rudbeckia) Columnaris.
Leucojum vernum.
Ligularia arnicoides.
Linaria alpina.
Linum alpinum.
" perenne.
Lotus corniculatus.
" " flore-pleno.
Lupinus polyphyllus.
Lychnis Chalcedonica.

Lychnis Chaledonica alba plena.
" " coccinea plena.
" dioica alba plena.
" Flos-cuculi rubra plena.
" Viscaria alba.
" " rubra plena.
Lysimachia nummularia.
Lythrum alatum.
Melissa officinalis variegata.
" rotundifolia, fol. var.
Mentha sylvestris, fol. var.
Muscari botryoides.
Myosotis alpestris.
Œnothera acaulis.
Ornithogalum aureum.
" pyramidale.
Orobus angustifolius.
" luteus.
" vernus.
Pæonia herbacea and Hybrids.
Papaver alpinum.
" bracteatum.
" orientale concolor.
Phlox decussata, suffruticosa, and Hybrids.
" subulata nivalis.
" " procumbens.
" " setaceus.
" vernus.
Polemonium reptans.
Potentilla alba.
" argentea.
" bicolor grandiflora.
" grandiflora coccinea
Pulmonaria Virginica.
" saccharata.
" Siberica.
Pyrethrum uliginosum and Hybrids
Pyrola rotundifolia.
Rudbeckia Drummondii.
" laciniata.
Sagittaria sagittifolia.
Salvia argentea.
" nemorosa
Sanguinaria Canadensis.
Saxifraga affinis.
" aizoides.
" crustata.
" geranioides.
Scrophularia mellifera, fol. var.
Scutellaria galericulata.
Sedum acre.
" glaucum.
" grandiflorum.
" micranthum.
" rupestre.
" Sieboldii.
Soldanella alpina.
" montana.
Solidago altissima.
" Canadensis.
" odora.
Spiræa digitata.
" filipendula plena.
" Japonica.
" trifoliata.
" Ulmaria, fol. var.
Symphytum orientale.
Thalictrum alpinum.
" anemonoides.
" glaucescens.
" lucidum.
Thymus officinalis, fol. var.
Tournefortia heliotropoides.
Tradescantia Virginica alba.
Tricyrtis hirta.
Trillium atropurpureum.
" grandiflorum.
Trollius Americanus.
" Asiaticus.
" orientalis.
" Tauricus.
Uvularia amplexicaulis.
" grandiflora.
Valeriana montana.
Veratrum album.
" nigrum.
Veronica amethystina.
" canescens.
" elegans.
" saxatile.

HARDY ORNAMENTAL SHRUBS.

Amygdalus nana.
" " alba.
Azalea nudiflora.
Berberis Canadensis.
" Nepalensis.
" purpurea.
Rubus Japonicus alba.
Calycanthus floridus.
" præcox.
Chionanthus Virginicus.
Cytisus elongatus.
" capitatus.
Cotoneaster microphylla.
Cratægus pyracantha.
Daphne Cneorum.
" Mezereum.
Deutzia crenata plena.
" gracilis.
" " fol. var.
" scabra.
Euonymus Americanus.
" Europæus.
Forsythia viridissima.
Halesia tetraptera.
Hibiscus Syriacus (Althæa frutex), vars.
Hypericum Calycinum.
" Kalmianum.
Hydrangea deutziæfolia.
" Hortensia.
" " fol. var.
" Japonica.
Jasminum officinale (requires protection in winter in Northern States).
Kalmia latifolia.
Kerria Japonica.
" " fol. var.
Lonicera Tartarica.
" " alba.
Berberis Aquifoliium.
Magnolia conspicua.
" purpurea.
" Soulangeana.
Philadelphus coronarius.
" nanus.
Pyrus Japonica.
" " alba.
Rhododendron Catawbiense, and Hybrids.
Ribes sanguinea.
" aurea.
Syringa vulgaris.
" " alba.
" " purpurea pleno.
" Persica.
" " alba.
Spiræa prunifolia, fl. pleno.
" callosa.
" " alba.
" Douglasii.
" Reevesii, fl. pleno.
Viburnum Opulus.
" " plicatum
Weigela rosea.
" " fol. var.
" " alba.
" amabilis.
" floribunda.
" hortensis.

HARDY CLIMBING SHRUBS.

Akebia quinata.
Ampelopsis bipinnata.
" hederacea.
" tricolor.
Aristolochia Sipho.
" tomentosa.
Bignonia atrosanguinea.
" grandiflora.
Bignonia radicans.
Clematis Flammula.
" viticella.
" " rubra.
" " alba.
[Tender. Protect in Winter.
" azurea grandiflora.
" " Sophia.

Clematis lanuginosa.
" Jackmanii.
Hedera Canariensis.
" helix.
" fol. variegata.
" Rœgneriana.
" Taurica.
Lonicera aurea.
" Belgica.
" bracypoda aurea reticulata.
Lonicera Halliana.
" Periclymenn.
" Japonica.
" sempervirens.
Periploca Græca.
Wistaria frutescens.
" " alba.
" Sinensis.
" " alba.
" magnifica.

CHAPTER XLIII.

CULTURE OF GRAPE VINES UNDER GLASS.

It is many years since I have had personal experience in the growing of grapes under glass, and this was so limited that I feel incompetent to do justice to the subject, even in the short treatise that my restricted space here will permit. For this reason I have called in the assistance of my life-long friend, Mr. Hugh Wilson, of Salem, Mass., whose knowledge of the subject is, perhaps, equal to that of any one in this country; but, unfortunately, the limited space at my command gives Mr. Wilson but a meagre chance for giving us the full benefit of his experience.

THE LOCATION OF THE VINERY.

As with all glass structures, the vinery should, whenever practicable, be in a situation sheltered from the north and west, and if the ground is gently sloping towards the south-east so much the better.

THE BORDER

or soil in which the vines are to be planted is an all important matter. It is rarely that the natural soil is of such

a character as would serve the purpose, and hence in nearly every case it is necessary to prepare the materials for the "border." The usual rule laid down is to take of the top spit (or spade's depth), from an old pasture, as the main material of the border—say three parts; lime rubbish, charcoal, scrapings from a paved street, or oyster shells broken up one part; rotted stable manure one part, with perhaps one ton of crushed bones added to every twenty tons of this border compost. Something depends upon the soil of the pasture from which the top spit is taken; if it is a heavy adhesive loam more in proportion of the lime rubbish or street scrapings should be added, as it is all important that when the organic substances of the manure or fibre of the sod are rotted away, that the material forming the border should not become sodden or solid, so that it would be retentive of water and impervious to air. For this reason, when choice can be made, the pasture from which this turfy top spit is taken should be of a shaly or calcareous character. If the whole material for the border can be prepared a year before using so much the better; let it be repeatedly turned so as to mix the different ingredients thoroughly. This is not indispensable, however, as we have often used them fresh with nearly as good results.

THE EXCAVATION FOR THE BORDER

should be made from 20 to 24 inches deep, and of the width of the grapery itself; and if the house is a "lean-to," 15 or 20 feet outside. For a span roof make it the same distance on each side outside. Above everything it is indispensable that this excavation be thoroughly drained—it should be formed so that the bottom slopes about 1 foot in 20 to the outside of the border, and there a drain should be placed of sufficient capacity as to quickly carry off all surplus from the rains that may fall on the border. Perhaps the safest and simplest plan to prevent the roots

getting through into the cold subsoil is to cement the bottom of this excavation. One inch in thickness of cement is enough. When this is done the border material may be thrown in, filling it up five or six inches higher than the general level to allow for settling. Be careful never to handle the materials for the border in wet weather.

OF THE CONSTRUCTION OF THE VINERY

little may be here said, as there are now architects in every large city, fully competent to give plans. I will simply say that for early forcing, or perhaps in all graperies where artificial heat is used, the lean-to or one-sided structure is preferable; while for cold graperies, or those not heated artificially, the curvilinear or span-roofed is the best. The "lean-to" may be 18 or 20 feet wide, and of any desired length, giving a length of rafter from 20 to 24 feet. When the curvilinear span for cold vineries is used, the base width may be 25 feet, which will give about 15 feet of rafter on each side. A house built after the design given for a rose-house on pages 135 and 136, will answer admirably for a cold grapery.

PLANTING THE VINE.

Amateurs planting graperies, commonly desire to procure vines that are two or three years old, but such as have had much experience with stocking new graperies know that a one-year-old vine that is well ripened, better answers the purpose than those of greater age; in fact it is a question whether a vine started from an eye in February or March, and planted in June, will not by September make as fine a cane as one of any greater age. As such vines are not very easily transportable or even procurable at all by beginners, the best thing they can do is to procure well-grown one-year-old vines and plant

them in spring, but not too early—say May in this latitude, or just when their buds are beginning to start if kept, as they should have been, in a cool place. It is best to shake the soil from the ball of the young vines that have been grown in pots, although the disentanglement or spreading of the roots, to which so much importance is by some attached, is of no consequence. In planting it has ever been my practice to set the roots outside, drawing the tops through the apertures formed in the wall, a little higher than the border inside the house (if there is one). The distance apart at which the vines should be planted is 3 feet. Strong galvanized wire should be run horizontally 15 inches apart across the rafters, and 15 inches from the glass on which to train the vines.

I may here state to such as may object to outside planting for hot house or forcing graperies, that I have grown vines so planted for twenty years in succession, and never failed to have a satisfactory crop.

Firing was begun each year about the first of February. Of course the border was covered up sufficiently with leaves or litter to prevent its being frozen. But for earlier forcing, say that beginning in December or January, it is necessary to heat such a border by the use of hot manure or leaves, which must be in sufficient depth to ferment; and it must be covered with boards in winter so as to throw off rain. The treatment of

VINES THE FIRST SEASON

is very simple, presuming they have been planted in May and were cut back to two or three buds inside the front wall. Select the strongest growth from one of these buds, tying it to the wires as it grows, and pinching off to one leaf the laterals or side shoots which it will throw out above the first joint, until it reaches the top of the house, after which let it revel at will.

THE SECOND SEASON

after planting, this single shoot or cane should be cut down to the foot of the rafter, from which a shoot will be allowed to grow as on the previous season. Vines are not allowed to fruit in their first year's growth. When the vines, however, are strong and well ripened, instead of cutting them down as above stated, I have adopted the following plan of fruiting the shoot, with good success:

On well-grown vines the shoot or cane will be well ripened, 7 or 8 feet from bottom of the rafter; this shoot is "layered" by being twisted once round (in order to check the flow of sap), in a 12-inch pot, which is filled up with vine border compost; roots will be emitted from this "layer" sufficient to sustain and mature the fruit, and as good a shoot will grow from *below* the layer as if it had been cut down, as is usually done; and if the young cane has been well matured the previous season, a good crop will be secured with no injury to the part of the vine relied on for permanent use. The layer after fruiting may be thrown away or cut off and used as a plant.

THE THIRD SEASON.

At the pruning of the ripe wood, instead of cutting the vine down to a third of its length, or five feet on a fifteen foot rafter, I think it preferable to leave two-thirds, and if the vine is strong and well matured it will break freely, but allow it to bear only a light crop. By doing this, I have found the strength of the vine better equalized, as a strong vine when shortened to five feet is apt to make a stronger growth on the following season, leaving the lower part comparatively weak.

THE FOURTH SEASON

a full crop may be taken, which should be about 18 or 20 lb. to each rafter of 15 feet in length.

TRAINING THE VINE.

In this short treatise I will confine myself to the "spur system," which is that easiest to comprehend by those beginning the culture of the vine. It is done in this way: presuming that the vine has reached its "third season," and has been cut back to say 10 feet from the foot of the rafter, the cane is allowed to branch or spur at each joint or eye, a shoot from the upper part of the cane is allowed to run to the top of the house, which completes the length of the cane. The side shoots, or bearing wood, is cut back or spurred to one eye. The vine is now complete. The upper part will bear its first crop on its next season's growth; the bearing wood when next pruned will be cut back as before to one eye, and so on annually the side branches or bearing wood to be cut back to one eye, the bunches of fruit being borne on the spurs annually.

IN FORCING VINERIES

the temperature to start with should be from 50° to 55° at night, with a day temperature of 10° or 15° higher, increasing 10° when the buds are fairly broken, which will be in about a month from time of starting; in six or seven weeks more the fruit will be set and the temperature may be raised 10° more, and so continued. Next in importance to temperature is

MOISTURE.

The vine luxuriates in what gardeners call a "tropical atmosphere," and during the whole period of its growth, particularly in our arid climate, the grapery should be copiously syringed twice a day with water of the temperature of the house, until the first young leaves are formed. Besides this, evaporating pans placed on the pipes should at all times be kept full of water. In cold

vineries, where there are no pipes, water should be freely dashed all over the floor; this necessity for moisture occurs during the whole period of the growth of the vine until the fruit is beginning to ripen, *except* that at the time the vines are in flower it must be discontinued, as a dry atmosphere is best fitted for the proper fertilizing action of the pollen. I have long believed the cause of

RUST ON THE GRAPE

is an excess of moisture at the time of the "setting" of the fruit; the "flower," the crop of petals, instead of dropping off will, in a moist atmosphere, adhere to the forming berry, and while being forced off by the growth of the latter, it leaves its impression on the tender skin, which increases in size as the berry grows and results in the well known mark on the matured fruit called from its appearance "rust."

THINNING.

The grapes should be thinned while the berries are not longer than peas; if left until the bunches are crowded, the process of thinning is not only much slower but the berries are more apt to be bruised. I have long been guided in thinning grapes by the fact (and one I think not generally noticed) that the flowers of the grape are produced in sets of three. In cases where each of the three flowers form a berry, two may be safely cut out in thinning; but in many instances two only are formed, and sometimes only one, which the operator must take into consideration in thinning. With large bunches it is necessary to cut away entirely from the heart of the bunch many of these sets of three alluded to. The large bunches of some of the varieties ought to be "shouldered," that is, the shoulders, or loose and overhanging portions of the clusters, are to be tied up from the main body

of the bunch, giving opportunity for fuller development. This is especially necessary in Hamburgs and Muscats.

SUMMER PRUNING

should commence just before the vines are in flower. The shoot may be shortened to one joint above the bunch intended to be left. Strong vines will often show two or three bunches on a shoot. The laterals which grow below the bunch must be rubbed off, while that which grows by the bunch and above it is to be left and shortened to one joint. When the laterals have again made a few leaves they need to be again shortened in the same way, all through the season while the vine continues to grow.

MULCHING THE BORDER

is always beneficial if not indispensable to the well-being of the grapery, not only to protect the roots from being frozen in winter, but also because when such fertilizing material as stable manure is used, the roots are drawn to the surface of the border, which greatly conduces to the health of the vine and the quality of the fruit.

PROTECTING THE VINES IN COLD GRAPERIES

is of great benefit. About the simplest way to do so is to run a board along 18 inches or so from the front wall. After pruning the vines (which may be done at any time after they drop their leaves), they are to be taken down from the wires and laid down between this boarding and the front wall, and the space entirely filled up with soil or sand. It is necessary, though, to watch that ground mice do not get to the vines, as they might destroy them by eating the bark. We have found that vines so covered up keep admirably, and that the plan is less liable to draw

vermin than when they are covered with straw or hay. They are usually covered up about the middle of December, and are not uncovered or otherwise disturbed until the first of May, when they are lifted up and tied to the wires, and started as before described. In cases where it is not practicable to cover with sand or soil, the vines can be laid down snugly along the front wall and covered up with mats or bagging; but in either manner of covering up the grapery must be freely ventilated during the warm part of the day, unless in extremely cold weather.

VARIETIES.

The varieties that I consider to be best suited for a cold vinery of 50 feet in length, requiring 21 permanent vines, would be: 12 Black Hamburgs, 2 White Frontignac, 2 Forster's White Seedling, 2 Purple Constantia, 2 Muscat Hamburg, 1 Royal Ascot.

For Vines for Forcing.—10 Black Hamburg, 2 Grizzly Frontignac, 2 Victoria Hamburg, 2 Golden Hamburg, 1 Buckland Sweetwater, 2 Muscat of Alexandria, 2 Cannon Hall Muscat; the last two at hottest end.

The growing of grapes for sale has not proved generally profitable here, at least not so profitable as the use of glass in the cultivation of vegetables or flowers, which probably may be accounted for from the fact that many gentlemen erecting graperies at first, solely for their family consumption, find that when they get to bearing full crops, there is more than can be used; and as "hot-house grapes" are an easily marketable article, and even at lowest rates seem to give a good deal of money for their weight, the surplus is thus thrown upon the market, bringing down the price below what is a paying rate to the regular grower.

I regret the necessity of being compelled to compress

these notes into so limited a space, being well aware that many of the points alluded to should have been more fully treated. But I trust what has been said may be of some benefit in guiding beginners who are entirely without any knowledge of grape culture under glass. To the experienced grape-grower it contains few facts but what he already knows, and is, no doubt, wanting in many that he is familiar with.

CHAPTER XLIV.

GARDENING AS A BUSINESS—HOW TO BEGIN.

In response to continued inquiries from those who wish to engage in gardening as a business, I propose in this chapter, to give briefly, yet comprehensively, such advice and instruction as my long experience, together with my intercourse and correspondence with hundreds engaged in the various branches of gardening enable me to offer. I find that the persons who desire to begin gardening as a business, are generally such as have had their tastes turned in that direction by being amateur cultivators. Their gratuitous distributions of slips, seeds, or roots, to sometimes not over-grateful recipients, starts the idea "that what is not worth paying for is not worth having," is as true of garden products as of other things, and that they had better sell than give. As selling means business, the question then is, how to best begin the business to make it pay. My advice to all such inquirers is, to keep away from large cities, unless they have a large capital and a thorough practical knowledge of the business. The beginner with limited means and more limited knowledge of the business, would be quite unable to compete with those who have been long established, and

such are to be found in nearly all cities of 100,000 inhabitants, or over. On the other hand, in cities of 5,000, 10,000, 15,000, or 20,000 inhabitants, the business may be begun, and profitably carried on, with but little capital and a moderate amount of knowledge at starting. How to start is the all important question. In my work on commercial gardening—"Gardening for Profit"—I have given advice on the culture of vegetables as a separate and distinct branch of the business. Further experience has led me to believe that it would often be of great advantage to the beginner in small towns, to undertake the cultivation of small fruits, flowers, and vegetables combined. In a town of say 5,000 inhabitants, the profits from the sale of flowers alone, would hardly be enough to warrant a beginning, while an acre or two of well grown fruits or vegetables in addition, would make quite a respectable business. We will suppose then that a frugal man, able and willing to work hard, has a capital of $1,500 to $2,000; let him select not more than two acres, either on a lease of say 10 years, or by purchase, as near to the business part of the town as practicable. The soil should be of a quality that has borne *good crops* of hay, corn, potatoes, or other farm produce. Do not be induced to go far from the business center of the town, because land is cheap there; it is better to pay $100 *rent* per acre for, say two acres, a mile from the center of a town, than to *buy* land at that price three or four miles distant for such a purpose. It is a fact beyond all question, that whenever fine specimens of fruit, flowers, or vegetables are offered for sale, a demand is created that did not before exist, and would not then have existed unless these articles were placed before the eyes of the people. Presuming then that the one or two acres is secured, if a dwelling-house, stable, or other buildings are to be erected, let them be placed, if practicable, on the north-east corner, so that the part of the land to be cultivated,

or where greenhouses are to be erected, be not shaded. If flowers are to be grown, of course a greenhouse is indispensable, and the proper construction of that is a matter of importance. Perhaps the most appropriate size for a beginnner is one 20 feet wide by 50 feet in length, which may be heated either by smoke-flues or hot-water circulating in iron pipes. At present prices the house would cost, if heated by flue, about $10 per running foot; if by hot-water, $15 per running foot. The details of construction, are given in other chapters of this work. This greenhouse, having an area of 1,000 square feet, should produce a crop of flowers and plants, when once properly stocked, which should sell for at least $1,000 each year. The stock of plants to begin with, purchased from any wholesale florist would cost from $100 to $200 according to kinds. The annual cost of fuel, labor, etc., after it is in running order, should not exceed $300 per year. It will be seen that the profit on the investment is good, if the work is mainly done by the owner; but a glass structure of this size would not pay to hire a man to work it, though it would be large enough at first for the wants of an ordinary population of 5,000. But such a population will buy far larger amounts in fruits and vegetables, and will probably buy ten times as many and give more for them if fresh and home grown, than they would for those that are packed and shipped from a distance. In fruits, strawberries hold the most prominent place, and a quarter of an acre will contain at two feet apart each way, about 2,500 plants. If these are planted by August 1st, from plants layered in pots in July, the ground having been properly prepared, at least 1,000 quarts can be gathered as the first crop; this is a low estimate, the best cultivators claiming to gather one quart per hill of the large fruiting kinds. Next in importance in small fruits come raspberries, blackberries, grapes, and currants, with which another quarter

of an acre might be stocked. This would leave, if there were two acres at the start, an acre and a half to be devoted to vegetables. Of this, one-eighth of an acre might be devoted to asparagus, and the same amount to rhubarb, beets and onions, cabbages, cauliflower, and lettuce, and to celery; cucumbers and melons, tomatoes and beans, may each have a quarter of an acre, while one-eighth of an acre may be devoted to other things not provided for. The cultivation of this quantity of land with such crops, together with the care of greenhouse, would require the labor of two active men during the summer months, and probably at some part of the time, three, but in winter, one man could easily do it all. One horse would be sufficient for cultivating and carting manure, etc., but the first plowing of the land in spring should be done by two horses, so that the work may be done deep and thoroughly. As to the cultivation of fruits and vegetables, it is not my object in this volume to give detailed directions "how to do it," for these reference may be made to the works on such subjects, I merely wish to show that in small towns the combined culture of fruits, flowers, and vegetables, can be more profitably carried on than the culture of either by itself. My first attempt at commercial gardening was a combination of the business of market gardener and florist, and even for the great market of New York, I believe it was more profitably conducted than if each had been run separately, for in wet or stormy days when they could not work in the open vegetable grounds, the men were turned into the greenhouses, where their labor was just as profitable and valuable as in the open field. But while arguing for the benefits to be derived from this combination of the several departments of a kindred business, let me be distinctly understood that it must be done at *one place*, so that all can be under the eye of the owner.

Twenty years ago, after the successful culture of a gar-

den of some ten acres, combined with quite an extensive greenhouse business, my ambition led me to think that if I made $3,000 a year from ten acres, I might as readily make $9,000 from thirty acres, so I undertook the cultivation of two other places, each some ten acres in extent, but about a mile apart. A trial of three years showed me that I had made a serious mistake, for I found that I was actually making less from my thirty acres than I had made from my original ten, and yet I had experience, capital, and I believe as much energy and business capacity as the average of mankind. Had the thirty acres been all in one spot, the result might have been different, but it is probable that the profits would not have been in the same proportion, as if ten acres only had been cultivated. This lesson was to me a salutary one, and I never hesitate to state my own case to any one who informs me of his intention of attempting to carry on gardening in two or more different places at once.

CHAPTER XLV.

CHEAP GREENHOUSES—HOW TO HEAT THEM.

In the *American Agriculturist* for November, 1874, I described and gave a diagram of a method of heating a greenhouse, 20 feet wide by 100 feet long, by the ordinary smoke-flue and with only one fire. Heretofore it had been generally believed that it was impossible to heat a structure of that size with but one furnace, and few ever risked a house more than one-third of the size with a single fire. The principle there described, although not a new one (as I afterwards ascertained, as it had been recorded in the Transactions of the London Horticultural

Society some 50 years before), had certainly never been generally practised, and its publication in the *American Agriculturist* created a great deal of interest, and also involved me in an extensive correspondence. In that article I showed only its application to that particular structure, which was too large and expensive for the wants of beginners in floriculture. I will here show how other houses of different designs and of smaller dimensions may be heated on the same principle. Figure 70 shows three of the usual ridge and furrow houses, which

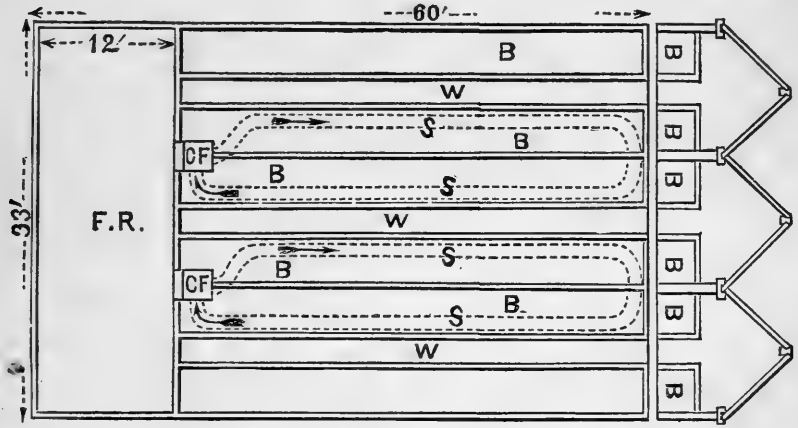


Fig. 70.—PLAN OF THREE HOUSES COMBINED.—Length, 60 ft.; width 33ft.

F, R, Furnace Room, 12×33 ft.; B, B, Benches, 4½ ft. wide; W, W, Walks, 2 ft. wide; S, S, Smoke-flue for heating; F, C, Furnace, with Chimney built on top of it.

are 60 feet long and 11 feet wide, each with a furnace or shed, at one end, which is 12 × 33 feet. Of course the length may be increased or diminished as desired, but this width is found to be the most convenient. It will be seen that the three greenhouses are heated by *two* furnaces, the flue being so disposed under the center benches of the houses as not to cross any of the pathways. This gives, of course, two runs of the flue to the middle house, and only one run each to the outside houses. This would in coldest weather give a temperature of not less than 40° to the outside houses, and 60° or 65° to the middle house,

which has the two runs of flues. This difference in temperature is indispensable in a general collection of plants, and the neglect of it is more than anything else the cause of failure where growers have but one greenhouse. It will be necessary to have the flues built as close to the walks as possible, so that the heat be evenly distributed in the two outside houses. Figure 71 shows a greenhouse 20 feet wide by 60 feet long, with furnace room, or shed, 12 × 20 feet. Here again the flues are so disposed as to avoid crossing the walks, being placed under the center bench, but as near as possible to the walk on each

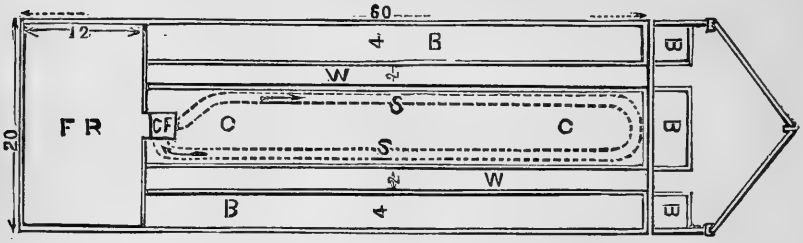


Fig. 71.—PLAN OF A SINGLE HOUSE—60 × 20 ft.

F, R, Furnace Room, 12×20 ft.; B, B, Side Benches, 4 ft. wide; C, C, Center Bench, 8 ft. wide; W, W, Walks, 2 ft. wide; S, S, Smoke-flue; C, F, Furnace with Chimney above.

side, so that the heat may be evenly diffused throughout. If a difference in temperature is required in a house of this kind, it may be obtained by running a glass partition *across* the house, say at 25 feet from the furnace end, which will, of course, make that end the hottest. It will be seen that the principle set forth in my article of November, 1874, is carried out in both these plans, and it would be unsafe to attempt to heat greenhouses of these dimensions without conforming to it. Its peculiarity consists in running the flue, in each case, back to the furnace from which it starts and into the chimney, which is built *on the top* of the furnace. As soon as a fire is lighted in the furnace, the brick-work forming the arch gets heated, and at once starts an upward draft,

which puts the smoke-flue into immediate action and maintains it; hence there is never any trouble about the draft as in ordinary flues having the chimney at the most distant point from the furnace. It will be seen that by this plan we not only get rid of the violent heat given out by the furnace, but at the same time it ensures a complete draft, so that the heated air from the furnace is so rapidly carried through the entire length of the flue, so that it is nearly as hot when it enters the chimney as when it left the furnace. This perfect draft also does away with all danger of the escape of gas from the flues into the greenhouse, which often happens when the draft is not active. Although no system of heating by smoke-flues is so satisfactory as by hot water, yet there are hundreds who have neither the means, nor the inclination to go to the greater expense of hot water heating, and to such, this revived method is one that will, to a great extent, simplify and cheapen the erection of greenhouses. Many old established florists, who have had the old plan of flues in use, have changed them to the one here described, and with great satisfaction. The wonder is that such an important fact has been so long overlooked, for at the time it was discovered, heating greenhouses by flues was almost the only method in use. As some may desire to know the cost of structures like those above described, I would say that, at present prices in the vicinity of New York, the plan of figure 70 would cost, complete, about $8 per running foot, or about $600 for the whole building, 72 × 33. The house shown in figure 71 would cost about $7 per running foot, or about $500 for the 72 × 20. This price is only for plain substantial work, such as is put up by commercial florists. The side and end wall is made of wood in the usual way, with cedar or chestnut posts, (locust is more durable than either,) and double boarded, with a layer of tarred paper between. For more complete instructions see page 67.

CHAPTER XLVI.

ROSE-GROWING IN WINTER—CONFLICT OF OPINION.

The matter of growing Roses for winter-flowering continues to engross much attention, and I have more than once written upon it in the columns of the *American Agriculturist.* The subject is now getting to be of such general interest in every section of the country where there are greenhouses, that anything that will tend to a further knowledge of the subject will, I know, be read with interest. There are three different systems in use; first, that of growing the plants in large pots, or tubs; second, planting out on prepared solid borders of soil, from 1 to 2 feet in depth, and another by planting out on raised benches or tables, in 6 or 7 inches of soil. Each of these systems has its advocates, who claim that one or the other is the best, and the novice in rose-growing (and it must be remembered that we have hundreds beginning every year), is puzzled to decide which system to adopt. I have tried them all with fair success in each, and have come to the conclusion that, taking all points into consideration, particularly where Roses are not grown exclusively, but only form a part of the general stock, that the plan of planting out on raised wooden benches, in 5 or 6 inches of soil, is the most profitable. The plants used are those struck from cuttings in February, and grown on in pots, so that by September they will be from 15 to 20 inches in hight. The soil in which they are planted, should consist of 6 parts thinly cut sod, from a rather heavy soil, to this is added 1 part rotted cow-stable manure, and 1 part sandy lime rubbish and oyster shells, all thoroughly chopped up and mixed together. The grassy fiber may hardly be decomposed before we use it,

but that will matter but little, only it will be necessary to cover this compost when placed on the bench with an inch or two of soil, so that any of the sod roots that may be alive will be unable to grow through it. The soil is put on about the middle of September, when the Roses, already prepared, are planted 12 or 15 inches apart. We use about 4,000 plants which are apportioned in number, as far as our knowledge goes of their merits, thus :

1000 *Bon Silene* (deep carmine) ; requires the warmest part of the house.

1,000 *Safrano* (saffron yellow).

750 *Isabella Sprunt* (canary yellow).

250 *Douglas* (purplish crimson) ; requires the coolest part of the house.

1,000 *Nephetos* (pure white).

Should no accident occur, this number of Roses so planted will average us 3,000 rose-buds per week from October 1st to June 1st. I need not detail here the after-treatment, that having already been fully done in Chapter XV., other than to briefly say that a night temperature of from 55° to 65° must be steadily maintained, with a day temperature of 15° or 20° higher. The plants must be freely syringed at least once a day, but watered at the roots only when dry, and then freely.

This method of planting Roses on raised benches necessitates their renewal at least once in every two years, as the soil in which they are grown becomes "washed out" by the frequent waterings ; we ourselves intend to renew the soil every season. The Roses planted in September are flowered to their fullest extent during winter, until the first of June. Each plant will have then formed a mass of fibrous roots, so matted that the soil is held by them, and which can be lifted by passing a spade under them ; when these are potted in pots or tubs suited to the size of the plant, no check is given to the growth. We lifted in this way, from benches,

the past season, Roses which were four feet high by as much in diameter, planted them in pots 15 inches wide, with hardly the loss of a leaf. By lifting every season in June, the plants can be set out-doors, and the whole care of watering and syringing the greenhouse can be dispensed with for the three hot summer months; this is a matter of very great importance, for in most locations there is never water enough, and even if there is, unless it is unremittingly applied, the Roses are certain to be seriously injured during summer. To be sure, the taking up of the plants and potting them, and removing the old soil in June, and again replacing with the fresh soil in September, is a good deal of labor, but not half that of caring for the Roses if they are kept under glass three months in summer, to say nothing of the unquestionable advantage of their having fresh soil to root in when again planted in September.

I have said that I consider this plan most profitable, particularly where Roses are not grown as the exclusive stock. One reason for this is that the space under the benches can be utilized for many purposes. If the main angle of the greenhouse faces south, as ours does, we find that a bench placed on the south side *under* the main bench (which is 3 feet above the path and 7 feet from the glass at its highest point), about half way between the bench and the ground, can be made as available for many purposes as the benches or tables exposed to full light. Our lower benches are 18 inches wide, with a board behind wide enough to prevent the dry air from the pipes injuring the plants. On these underneath benches, we have grown during the past season, Ferns, Lycopodiums, Cape Jessamines, Irises, and all plants which naturally grow in the shade, and in spring, when these were disposed of, have again used this under space to sprout Sweet Potatoes, Dahlias, and Tuberoses. The space under the benches is generally utilized by placing

the plants on the ground floor, without any protection from the heat radiated from the pipes, and in consequence they soon present a wretched appearance; but when regular benches are constructed, as above described, the plants of the kinds suited to such treatment can be grown nearly as well as when exposed to direct light. It will be seen that this economy of space is of great importance, as it gives just so much more bench room, with no more cost in the labor of firing, of fuel, or of construction of the building. The under bench room used by us now is upwards of 10,000 square feet. If we used all solid benches on which to grow our roses, or other plants, this room would not be available. These wooden benches require to be replaced every 6 or 7 years, but their cost is nothing when compared to the saving made by their use.

CHAPTER XLVII.

THE INJURY TO PLANTS BY FORCING.

In an article written some time ago, I referred to a disease which was very destructive among many of the older varieties of monthly Carnations, or Pinks, which we have been forcing for the last 20 years. I then suggested that the trouble was in consequence of this excessive forcing, which had so lessened the vitality of the plants, that disease followed whenever the conditions were slightly unfavorable, such as too wet or too dry a soil. Since then, our observations have shown that nearly all the varieties of Roses in use for forcing for winter flowers are similarly affected. About the first of May this year I planted out in the open ground Safrano, Bon Silene, Douglas, Mareschal Niel, and four other varieties, which had been used for forcing during the winter. At the

same time we planted out over 30 varieties of other tea-roses, that had been grown during winter in a cold house without being forced. The plants of both lots were all seemingly in fine healthy condition, but about July 1st we found that the forced varieties had not only made a much weaker growth than the others, but probably twenty per cent died outright. In a conversation on this subject with Mr. Miller, the well-known florist and landscape gardener of Germantown, Pa., he cited the case of a nurseryman in England, who sent out the Dahlia, "Beauty of Hastings"; the first year it was exhibited from the seedling plant, it was found to be so entirely double, as to have what is known as a "hard center." It had been freely exhibited, and being the finest of its class at that time, orders for hundreds of plants were consequently received for it. To obtain the plants to fill the orders from the limited stock, it was forced in a temperature unusually high; other cuttings were taken from the cuttings already struck, so that a dozen roots were made to produce nearly 3,000 plants. When these plants came into flower, instead of producing the fine form and double variety that had been exhibited, nearly all produced single flowers. This brought a storm on the head of the unfortunate nurseryman, who was charged with sending out a spurious variety, and he had not only to refund the money which he had received for the plants, but was seriously injured in his business standing. That single flowers were produced in consequence of lessened vitality, was shown by the fact that these self-same roots produced in the succeeding year and afterwards double flowers like the original, and for many years the "Beauty of Hastings" was known as a standard sort. Again, we remember that in the day of the grape-vine fever, the "Delaware," and some other varieties, by being propagated in a high temperature and from the young shoots year after year, became so weakened, as to hardly be re-

cognized as the original variety. Plants of Rhubarb, after they have been forced, are usually thrown away as useless, and the Lily of the Valley takes years to recuperate in the open ground after it has been once made to bloom in the hot-house. If we consider that this treatment of the natives of temperate latitudes, is in direct violation of their natural condition, we will not wonder that they rebel against the abuse. The Carnations, Roses, and Grapes, are hardy, or nearly so, in northern latitudes, and their nature requires a rest of three or four months. Our forcing system, now so universally adopted to produce the flowers of the Carnation and Rose in winter, subjects them to a treatment similar to that proper for tropical plants; and this continued violation of their natural requirements of culture, results in the evils alluded to. I never like to refer to any disease or other trouble among plants, without being able to suggest a remedy. In the Carnation we would advise that, instead of propagating them as usual from cuttings made in spring, from plants that have been forced all winter, the cuttings be taken at the time the plants are lifted in fall; after they are rooted, the young plants may be kept in a cold greenhouse or frame during winter. The same plan might be adopted with the Roses forced in winter, if the plants are wanted for summer flowering in the open ground. I know it is not always convenient to do so, but when it is, I think it will be found a good method to maintain the vitality of the stock.

CHAPTER XLVIII.

A USEFUL METHOD OF PROPAGATING PLANTS.

A good many years ago, we published a method of propagating Geraniums, that we believe originated with us, and which we called, for want of a better term, "Layering in the Air," referred to at page 240. It consisted in tonguing the shoot to be used as a cutting, half through with a knife, as in the ordinary layering; the shoot so treated formed granulations, or "callus," on the cut surface, and was in a condition to form roots immediately on being detached and put into the earth. Like many other useful practices, this was abandoned or forgotten by us, until the fall of 1877, when we saw that, owing to the unusual dry summer, our stock plants of many of our finest ornamental-leaved Geraniums, and other plants of like character, was so apparently lacking in vigor, that to detach cuttings in the ordinary way of propagation, would probably not only result in the loss of the cuttings, but be of great injury to the "stock plants" themselves, by so denuding them of leafy shoots in their then weak condition. Here we again bethought ourselves of our long forgotten plan of "layering in the air," but this time we improved upon the former way of doing it. Instead of tonguing the shoot to be used for a cutting, as before, it was merely snapped short off, at a point where the condition of the shoot or slip would make it hang on to the plant, by the merest shred of bark, as shown in figure 72. Slight as this strip of bark appears to be, it is sufficient to sustain the cutting, without any material injury from wilting, until it forms the "callus," or granulated condition, which usually precedes the formation of roots. The cutting, or slip, may be detached in from 8 to 12 days, after

it has been broken in the manner described; and then potted in 2 or 3 inch pots. If watered and shaded rather less than required by ordinary cuttings, it will form roots in 8 or 12 days more, and not one in a hundred will fail, even of plants of the Tricolor Geraniums, which we all know are difficult to root under the ordinary modes of propagation, particularly in hot weather. We last fall

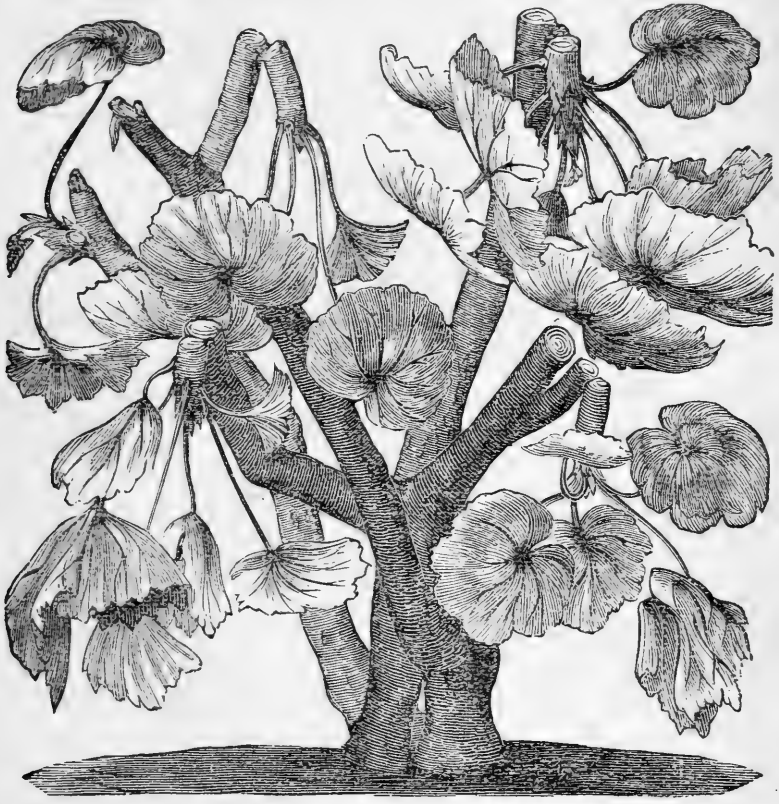


Fig. 72.—CUTTINGS PARTLY SEVERED.

propagated in this way nearly 10,000 plants of the Tricolor class, with a loss of one per cent; had we adopted the ordinary method, even with the plants in good condition, our experience has been that a loss of at least 50 per cent might have been expected.

This plan is applicable to many other plants as well as

Geraniums. The following may be propagated with great certainty by this method, using the young unripened shoots: Abutilon, Begonias, Carnations, Heliotropes, Crotons, Cactus of all kinds, Lantanas, Oleanders, Petunias (double), Pelargoniums, or Geraniums of all kinds, Poinsettias, together with nearly all kinds of a half woody or succulent character.—Besides the absolute certainty of having the cuttings root by this method, it has another most important advantage: All propagators know that many kinds of plants when cut back for cuttings, become weakened so much that, if not carefully handled, they may die; also that if two or three crops of cuttings are taken off as they grow, the "stock plant" becomes permanently injured. By this method of breaking the slip, so that it hangs by a shred to the parent plant, the roots have to use their functions for its support nearly the same as if it remained entirely attached to the plant. This results, exactly as we wish, in causing the parent plant to strike out shoots *below* the broken slip, and these again, in their turn, can be so treated.—We are using this method of propagating this winter on all such plants as we wish to make the most of, and with satisfactory results.—I may say that, in certain conditions of the shoot, instead of snapping it will "knee" or bend only; in such cases, it will be necessary to slip it two-thirds through with a knife, but in most instances it will snap and hang by the shred of bark, which is the best condition.

CHAPTER XLIX.

FLOWERING HYACINTHS IN MOSS.

Most of the readers who have cultivated Hyacinths and other Dutch bulbs, know how to manage them when grown in ordinary soil in pots, or in glasses of water, but few are aware that they can grow them better in moss, (Sphagnum), than in either. This moss is found in many of our swamps, and is largely used by florists and nurserymen for packing plants to send to a distance by mail or otherwise. Its light sponge-like qualities are such as the roots of Hyacinths and other bulbs delight to revel in, and in which they grow luxuriantly. The moss may be either used to fill pots, window-boxes, or wire, or other baskets. A wire basket in which four or five different varieties of Hyacinths are planted, presents a very attractive appearance when suspended in a window or other part of the room. In filling the moss into the pots, boxes, or baskets, it should be pressed moderately firm, and the Hyacinths planted with one-third of their thickness above the surface. After planting, the moss should be watered sufficiently to thoroughly saturate it, and after the surplus water has run off, the baskets or other receptacles are to be placed away in some dark cool place, such as a cellar, or dark closet, where the temperature does not exceed 50°. In five or six weeks after planting, the moss will be found to be filled with roots, and the bulbs may then be taken from their dark quarters into the light; and if kept in a temperature of 60° or 70°, they will flower abundantly in three or four weeks after; the moss must be kept moist at all times. The flowers of the Hyacinths will be greatly increased in size

and brightness of coloring, if they are watered with guano water once a week. This should be very weak; one pound of guano to 15 or 20 gallons of water, or a pound of sulphate of ammonia may be used instead of the guano, in the same quantity of water. The advantage of using moss for Hyacinths, etc., is in its lightness and cleanliness in handling. The wire baskets, especially when filled with moss, present a much more pleasing appearance than they would if filled with soil. The bulbs may be planted from October to January, and by planting at intervals of two or three weeks, a succession of bloom may be had from January to May.

CHAPTER L.

THE PRICES OF NURSERY AND GREENHOUSE PRODUCTS ABROAD AND AT HOME.

While the price of labor is from one-third to one-half more in this country than in Europe, nearly all the products of the nursery, greenhouse, or garden, are sold lower here than there—not merely lower, but in a majority of cases at less than half the price. In nursery stock, I have the authority of Messrs. Ellwanger & Barry, of Rochester, N. Y., for stating that, in many leading articles in fruit trees, the differences in prices in favor of this country are as follows: In England, "Standard" Apple-trees are quoted at $18 per 100; the same quality are sold here at $12 per 100. Dwarf Pear-trees there sell at $35 per 100; here at $15 per 100. Standard Pear, Plum, and Cherry-trees average in England $18 per 100;

here $15 per 100. Apricots and Nectarines are sold for about the same price here and in England, but Peach-trees, which are sold here at an average of $70 per 1000, are sold there at $150 per 1000. The general assortment of ornamental trees and shrubs shows a corresponding average in favor of lower prices here. In greenhouse or bedding plants, the difference in favor of our lower rates here is even greater, both at wholesale and retail. Roses, for example, which are sold lower in Europe than almost anything else, can rarely be purchased at less than $15 per 100 ; here, the same quality averages $12 per 100. Carnations, or Pinks, which are quoted in England as specially low at $20 per 100, are sold here at $12 per 100. Ferns sold here at $8 per 100, are offered at $12 there ; Tuberoses and Gladioluses that are sold here at $4, are quoted there at least double these rates, while, to take the average of bedding or greehouse plants, that may average here $10 per 100 to the trade, are offered to us by the wholesale English houses as specially low, at $12 per 100.

Owing to the unusually dry weather last summer, nearly all our stock Fuchsias were destroyed, so that we had to import from London ; the price paid was $25 per 100, the very same quality that we sell at $12 per 100. In sales at retail, particularly for new plants, the prices paid in Europe are fully four times more than we charge here. For example, a new Rose, when first offered, is sold in London at £1. 1s. (about $6) the plant ; here, the first sales of the same are at from $2 to $3 each. New Fuchsias or Geraniums are rarely sold in London at less than $3 each ; here we think we are getting well paid if we get one-fourth of that sum. In addition to the greater price paid for the article itself, they invariably saddle us with the expense of boxes and packing, often no small item, which is rarely charged by our florists. If we add to these our 30 per cent duty, which our government in its wisdom exacts for these perishable commodities, it

may well be wondered that Europe can ever sell to us at all, particularly when it is known that at least one half of the imported plants are lost by injury sustained in transit. The question arises, how can our nurserymen and florists sell so much lower, and make the business pay—for that they do make it pay quite as well as European growers do, there is but little doubt. The answer to this is, the known fact that the high cost of labor, has long ago forced us to use our ingenuity in simplifying our work. What we do with the plow, the English gardener still thinks it necessary to do with the spade. What we do with our horse or hand cultivator, he still does with the hoe, and often a very primitive sort of hoe at that. Where we use stakes and labels that are made by machinery, they, in many cases, yet make them by hand, when a single one, actually costs as much in labor as do a hundred when made by machinery. When it comes to the manual operations, necessary in the propagating and growing of greenhouse plants, the same waste of labor is apparent. Our average propagator will take off, make, and set in bench, 1,000 cuttings per day; at the rate I saw the propagators of two of the leading establishments in London working, when there a few years ago, I doubt if the average was 200 a day, and when we tell them that some of our crack workmen can place 10,000 rooted cutting in pots in 10 hours, they honestly think it false, for probably not more than one-third of that number has ever been done in the same time there. I do not wish to be understood as saying that the English gardener can not move as rapidly as the American can, but custom there clogs his hands with unnecessary work, to accomplish the object desired. The other day, a man of 40 years of age, presented himself to me, with credentials from a long established Edinburgh firm, stating him to be an experienced propagator and cultivator of plants. To test his capabilities, I handed him a lot of rose cut-

tings to prepare, every one of which he cut at an eye or joint, in the approved orthodox style of a quarter of a century ago: all propagators of experience here have long known, that this is not only a great waste of materials, but a still greater waste of time, and we never do it unless in particular cases that very rarely occur. I might mention scores of similar operations which are performed abroad in a manner which seems to us as primitive as this.

Those who have studied the subject, tell us that from the specimens of the "stone period," at the Smithsonian Institution at Washington, there is reason to believe that it took some thousands of years for our "rude forefathers" to discover that the handles could be better fastened to their hammers of stone, by drilling a hole through them, than by lashing them to the handles with thongs; and it is a matter of not very ancient history, that in parts of the South of Ireland, the plow was attached to the horses' tails, and that a great row was the consequence when some meddling innovator suggested a change. It appears that mankind, in all ages, is naturally conservative, and it takes years, sometimes centuries, to get out of old ruts. If, while paying for labor one-third more, we can sell our garden products here nearly one-half lower than they are sold in Europe, the conclusion is inevitable, that we have learned how to make our labor more effective than they do.

The adage, that "A prophet is not without honor, save in his own country," is true in this matter as in many others; for we find that most Americans having horticultural tastes, when visiting Europe buy largely there, their plants costing them, when duties are added, three times as much for half dead trees or plants, as they would pay at home for healthy ones. It is often the case, especially with fruits, that the varieties purchased are utterly useless for our climate. For example, the Jargonelle Pear, Ribston Pippin Apple, and Keen's Seedling Straw-

berry, still hold a first place in the English gardens, while experience has shown them to be worthless here. So with many ornamental trees; beautiful as are the varieties of English Holly and Rhododendrons, hundreds of Americans have poured down anathemas on the heads of European nurserymen for selling them as "hardy," plants that the frosts of our Northern States, or the hot sun of the South, utterly destroyed the first season.

CHAPTER LI.

DIARY OF OPERATIONS FOR THE YEAR 1867-68.

The following diary of operations and observations of temperature was taken by my general foreman, at our green-houses at Bergen City, N. J., from September 9th, 1867, to September 9th, 1868. Although it necessarily contains many repetitions and matters of minor interest, it will be found very valuable as a guide to the beginner, as well as for convenient reference to those of mature experience. We, ourselves, find such a diary an excellent monitor, as the importance of dates in all horticultural operations can not be over-estimated. The record of the thermometer is placed at the end of the notes for each day, the first figure giving the temperature in the shade at 6 A.M., and the second that at 6 P.M.

SEPTEMBER, 1867.

9th.—Lifted and potted Bouvardias, preparatory to planting them out again on the benches for winter. It is of the utmost importance that Bouvardias should be potted early—not later than the middle of September, in this section. If left until cool weather sets in, they will not

root freely in the pots, being plants that luxuriate in a high temperature. The plants are kept shaded and watered carefully, for a week or so after being potted, and it is better to keep them outside until they are placed permanently in the green-house. Also, put in cuttings of Variegated Geraniums of various kinds this day. Topped Carnations, for the purpose of producing suitable cuttings in October; it is now too late to cut back those that are wanted for winter flowers. Collected seeds of Salvia patens and S. splendens. Cleared off old plants of Pansies, to allow the self-sown seedlings light and air. 60°—62°.

10*th.*—Continued potting Bouvardias. Put in cuttings of Zonale Geraniums; also, a few cuttings of those Verbenas of which our stock is short. 61°—64°.

12*th.*—Repotted Double White Primulas, for winter flowering. Sowed Cabbage, Cauliflower, and Lettuce seed in open ground. 59°—55°.

13*th.*—Repotted Fuchsias for stock. Layered Strawberries in 2-inch pots, to make a plantation next month. 54°—60°.

14*th.*—Began propagating general collection of Verbenas; cuttings in excellent order. Collected flower seeds of all kinds. 58°—59°.

16*th.*—Repotted Euphorbia, Poinsettia, and other plants for winter flowering. Lifted and potted stock Geraniums. 55°—59°.

17*th.*—Began propagating a general collection of bedding plants, and as the weather is getting somewhat hotter, precaution is taken to douse the walks, benches, and all parts of the propagating houses with water, to reduce the temperature. 65°—75°.

18*th.*—Collected seeds of Campanulas, Lychnis, Delphiniums, and other hardy herbaceous plants, and sowed at once; nearly all seeds of this character germinate better if sown when gathered. Cut back Centaurea and

Cineraria, to produce young shoots to be taken for cuttings, a month or so later. 69°—74°.

19*th.*—The same. 72°—75°.

20*th.*—Budded Roses and potted off in 2-inch pots the Verbena cuttings that were put in on the 10th and 12th inst. Result excellent. No fire heat has as yet been used in propagating. 68°—70°.

22*d.*—Planted those Bouvardias that were potted on the 9th inst., on the benches of the green-house. They are taken from the pots and planted in 6 inches of soil, at a distance of from 8 to 12 inches apart, or near enough for the plants to touch. The distance apart is regulated by the size of the plants. Began to propagate second and largest lot of Verbenas, being rather safer at this date than the previous ones of the 10th and 12th, on account of a general lower temperature. Gathered Verbenas, Salvias, and other flower seeds, that are in better state now than they were two weeks ago. 52°—52°.

23*d.*—The same as yesterday. 42°—51°.

24*th.*—Put in main crop of Verbena cuttings from open ground at this date. Fumigated green-houses for the first time this season; will continue to do so at least twice every week until the green-houses are again empty of plants, the order being that aphis or green fly must never be seen. 43°—55°.

25*th.*—Lifted Carnations with balls of earth from the open ground, and planted them in 5 or 6 inches of soil on the benches of the green-houses for winter flowering. We are enabled to lift them in this way from the peculiarity of our soil, which is stiff and clayey; on most soils this practice would not be practicable; if the soil did not adhere to the roots it would be necessary to first pot them, as in the case of Bouvardias. Put in cuttings of Variegated and Zonale Geraniums for main crop. 58°—60°.

26*th.*—Continued putting in Verbena and other cut

tings First (slight) fire used in propagating house. Shaded and watered freely Carnations put in yesterday. 40°—44°.

27*th.*—Planted out in the benches Eupatoriums, Stevias, &c., that have been kept in pots all summer. 42°—50°.

28*th.*—Put in cuttings of Coleus, Salvias, Centaureas, &c., from outside. Budded Roses. 42°—49°.

30*th.*—Put all tender plants in the houses, as from about this date there is danger from frost. Lifted clumps of double Neapolitan Violet, and planted them at distances of 9 or 10 inches apart, on the benches of the green-house, in the same way as the Carnations. The same precautions necessary in shading and watering, if the weather is dry and sunny. 42°—50°.

OCTOBER, 1867.

1*st.*—Lifted and potted Lamarque, Marshal Niel, and other Roses from the open ground, that are wished for early flowering in spring; it is yet too soon by a month for general potting of Roses for spring flowering. 42°—53°.

2*d.*—Potted off Petunias, Zonale Geraniums, and other bedding plants that were put in as cuttings on the 17th ult. Planted out Stevia compacta and other varieties on benches of green-house; as they are too tall, they are planted by laying them on their side, which answers well. Lifted up and planted Strawberry runners closely together, so that they can be conveniently got at in spring for early orders. Planted early, they make root sufficient to stand the winter. 42°—52°.

3*d.*—The same as yesterday. 49°—56°.

4*th.*—Potted off Verbenas put in on the 22d ult.; had excellent success. 47°—50°.

5*th.*—Lifted from ground stock plants of Variegated and Zonale Geraniums, and potted them. 49°—54°.

7*th.*—Operations same as Saturday. To-day shows the

first ice, and very tender plants outside are somewhat injured. *Dahlias uninjured.* 33°—48°.

8*th.*—Corrected and re-labelled Dahlias, in anticipation of their soon being cut down by frost. Potted off Verbenas, and put in cuttings of Verbenas, and Rose and Zonale Geraniums. 34°—46°.

9*th.*—The advancing season warns us to house Lemon Verbenas, Geraniums, and other of the more hardy plants that have yet been standing outdoors. Lemon Verbenas being deciduous (shedding their leaves), are put *under* the benches, as they can there be kept with safety until March, when they begin again to start; the temperature will average 45° under the bench. 46°—52°.

10*th.*—Put in cuttings of Verbenas, etc. 50°—62°.

11*th.*—Lifted Japan and other Lilies and placed them closely together, covered with 4 inches of sand, at the north side of a wall, to retard them for spring sales; they are lifted for this purpose only, as nearly all Lilies are hardy, and will always do better left out undisturbed all winter where they grew; though if the situation is very cold or exposed, a covering up with a few inches of sawdust, leaves, or manure, will benefit. In planting out the Lily bulblets in open ground, see Chapter on Propagation of Lilies. 48°—61°.

12*th.*—Put in cuttings of Fuchsias, Heliotropes, and Carnations. 49°—62°.

14*th.*—Lifted Tuberoses, and placed them in empty benches of green-houses to dry. Tied down the flowering shoots of Tuberoses that are getting against the glass. 44°—52°.

15*th.*—The same as yesterday.

16*th.*—Put in cuttings of Carnations and Pinks of all kinds. 44°—58°.

17*th.*—Pricked out Cabbage, Cauliflower, and Lettuce plants, that were sown on the 12th of September, in cold frames. 50°—61°.

18*th.*—Pricked out in shallow boxes seedlings of Delphinium, etc., sown on the 4th of last month. 50°—61°

19*th.*—Planted Pansy seedlings that were sown on the 15th of September, in cold frames, 4 to 5 inches apart each way. 52°—68°.

21*st.*—Continued planting Pansies, and put in Verbena cuttings, taken from the open ground. Collected seeds of Verbenas, Salvias, etc., etc. 53°—55°.

22*d.*—Potted off the Verbenas put in on the 8th inst.; also, Coleus, Centaurea, Salvias, etc., that were put in on the 28th of September, all of which, except the Centaurea, have succeeded well; a partial failure in these is owing to the cuttings being too hard when put in. 54°—63°.

23*d.*—Lifted, divided, and potted Callas. 44°—46°.

24*th.*—Repotted Stock Giliflowers. First severe frost. Dahlias and all tender plants cut down. 24°—46°.

25*th.*—Made cuttings of a general variety of soft-wooded plants, of such as have yet stood uninjured in the open ground. 36°—44.

26*th.*—Moved the first potted lots of Verbenas, to prevent them rooting through in the sand. 35°—41°.

28*th.*—Potted off Fuchsias, Heliotropes, etc., from propagating house. Lifted Roses from the open ground for shipment. 40°—56°.

29*th.*—Potted Myrsiphyllum (Smilax) asparagoides, from seed boxes, (sown on August 1st); cleaned up and top-dressed Double Primulas. 50°—50°.

30*th.*—Continued lifting Roses for shipment. 46°—54°.

31*st.*—Put in Carnations and Pink cuttings; we find greater success at this season than earlier, it being very important that Carnation cuttings are rooted at a low atmospheric temperature. 41°—53°.

NOVEMBER, 1867.

1*st.*—Potted Roses for spring blooming and sales, first pruning off one-third of the shoots. This operation of

pruning should always be done before the plant is potted, as it takes less than half the time, and the plant being divested of its superfluous shoots is much more quickly and easily handled in potting. The plants after potting are freely watered *once*, to consolidate the soil, and if the sun s bright and warm they are shaded by latticed shutters The plants are placed in a cold green-house or cold frame, care being taken to keep them as cool as possible, and on no consideration to use fire heat unless to keep the soil in the pots from freezing. If possible, Roses should never be kept at a higher temperature than 40° by fire heat, until the young or "working roots" are formed. See Chapter on the Rose for more comprehensive details. 41°—53°.

2*d*.—Continued potting Roses, and put in Antirrhinum, Pentstemon, and other cuttings of half hardy plants from the open ground. 45°—53°.

4*th*.—Cut down and placed *under* the benches the Dahlias that have been grown during summer in pots. 47°—48°.

5*th*.—The Bouvardias, Carnations, Stevias, etc., are now blooming profusely. 33°—40°.

6*th*.—The cold weather warns us that everything must soon be secured, so to-day we take up, divide, and pot for spring sales, herbaceous plants of all kinds. 31°—40°.

7*th*.—Last night's frost finally destroyed the Dahlias, so we lifted them up and secured them to-day, by drying on the empty benches of the green-house. Those to be started for cuttings in March are now placed at once in soil and kept there without water until they start; in this way every root can be saved. 30°—42°.

8*th*.—Planted in the open ground the Strawberry runners that were layered in pots, and covered them close up to the neck of the plants with rough manure. Put in Carnation, Begonia, Petunia, Verbena, and other cuttings, for the first time, from plants that have been growing in the green-house. 41°—52°.

9th.—Put Tuberose bulbs that have been dried on the *top* of the benches underneath, to make room for plants needing light. 42°—50°.

10*th.*—Overhauled boilers and examined valves, preparatory to winter work. 42°—51°.

12*th.*—Again resumed the potting of the general collection of Roses, which had to be partially suspended for more pressing work. First snow, 2 inches deep. 34°—40°.

13*th.*—Potted Verbena cuttings and Roses. 33°—32°.

14*th.*—Lifted Violets from open exposure and placed them in a sheltered spot for planting out for stock in spring. 30°—45°.

15*th.*—Put in cuttings of Variegated and other Geraniums from plants that have been under glass since October 5th. 33°—34°.

16*th.*—Potted off cuttings of Geraniums that were put in the cutting bench in September. The cuttings were too soft, owing to the season, when they were put in, and in consequence have taken longer to root, yet have nearly all taken. 36°—40°.

17*th.*—Lifted and potted stock plants of Chrysanthemums and Phloxes. 28°—25°.

19*th.*—Put in cuttings of Pelargoniums, Geraniums, Carnations, etc. 18°—25°.

20*th.*—Lifted Roses from the open ground and heeled them in under cover, as we are apprehensive they may yet freeze in the ground, and our potting of Roses is two weeks later than usual. 37°—39°.

21*st.*—The same. 33°—40°.

22*d.*—Received six cases of new plants from London, in fair order; we find this time of the year and March the safest in which to import. Earlier in the season, the temperature is too high, and in the time intervening between November and March there is danger from frost. 32°—43°.

23*d.*—Put in cuttings of Roses made from ripened wood, and placed them in a cold frame, so sheltered as not

to be frozen in winter. But the result from this method is far less satisfactory than in propagating Roses from cuttings of the young wood; here we lose an average of 50 per cent, while from the young shoots, if done at the time and in the manner described in the Chapter on Propagation, not even 1 per cent need be lost. 39°—45°.

25*th.*—Removed the shading from the glass over Chinese Primroses. 44°—49°.

26*th.*—The same. 50°—47°.

27*th.*—Cleared the ground of the remaining Roses and Shrubs, preparatory to plowing up for winter. 34°—43°.

28*th.*—The same as yesterday. 43°—48°.

29*th.*—Overhauled and arranged recently potted off plants. Tuberose flowers are now produced in quantity from bulbs that were planted in benches in green-house, on August 1st; price $6 per 100 florets. 42°—50°

30*th.*—The same. 38°—24°.

DECEMBER, 1867.

2*d.*—Potted off cuttings of Carnations and Pinks that were put in on the 11th of October; loss heavy, as they have been put in two weeks too early. 27°—28°.

3*d.*—Potted off cuttings of Pentstemons, Antirrhinums, etc., which were put in a month ago. Very successful. 30°—35°.

4*th.*—Continued potting Roses, and putting in hard-wood cuttings of Roses. 26°—30°.

5*th.*—Flowers of Bouvardias, Carnations, Heliotropes, Roses, and Tuberoses, are now produced in large quantities from the plantations previously made, as recorded. We find that in the planting out of Tuberose bulbs on the 15th of July, 1st of August, and 15th of August, those planted on the 1st of August give the most profitable results; the first date being too early, brings them in while the market is

gutted, while by that of the 15th of August, the bulbs get too much exhausted by being kept dry too long out of season. 26°—28°.

6*th.*—Finished potting Roses. The operation has occupied in the potting alone the time of three hands for about three weeks, the average work of each being 700 plants per day.

7*th.*—Put in cuttings of Verbenas, Carnations, Zonale and Variegated Geraniums, Pelargoniums, and soft wooded plants of all kinds, the condition of the temperature from this date to the middle of March being such that cuttings of every description are rooted with unerring certainty, if the simple conditions which we lay down in Chapter on Propagation are followed.

9*th.*—At this date, we number 20,000 of our staple plant, Verbena. These we will multiply from ten to fifteen fold, until the first week in May, which is as late as the Verbena can be propagated, to make a plant of sufficient strength. 30°—26°.

10*th.*—Potted off Carnation cuttings, which were put in on November 8th, from plants grown under glass, and which have done very well. Repotted and cleaned up Double White Primroses. 27°—28°.

11*th.*—Put in green cuttings of Bouvardias. This mode of propagating the Bouvardia is not so good as by the root, but it is necessary sometimes to do so when we wish to increase new sorts rapidly. 27°—28°.

12*th.*—Put in cuttings of a general assortment of plants. 20°—8°.

13*th.*—The same. 4°—8°.

14*th.*—Put in Carnation cuttings from plants that have been somewhat exhausted by forcing for flowers. 14°—12°.

(*Note.*—10th January, 1868. Result nearly a failure, owing to the unsettled condition of the cutting).

16*th.*—Began staking Roses to-day. If stakes are pro-

vided, the average work for each hand is 500 plants per day. Experienced hands should nearly double that number. 16°—24°.

17*th.*—Put in cuttings of the new Fuchsias, Chrysanthemums, etc., from the plants which were received from England on November 22d. 22°—28°.

18*th.*—Repotted Lantanas, Variegated Geraniums, and other plants, kept in hot-house range. 23°—20°.

19*th.*—Potted off cuttings. 11°—10°.

20*th.*—The same. 8°—26°.

21*st.*—Put in root cuttings of Anemone. (See Propagation). 22°—26°.

23*d.*—Shipped to-day large numbers of Verbenas, packed in close boxes. (See Chapter on Packing). 28°—26°.

24*th.*—Put in cuttings of Coleus, Lantanas, Fuchsias, Petunias, etc., etc. 27°—30°.

25*th.*—Christmas Day. 30°—36°.

26*th.*—Continued propagation of all kinds of plants. 42°—38°.

27*th.*—The same. 44°—40°.

28*th.*—Repotted Zonale and Variegated Geraniums, to induce growth to produce growth for cuttings. 36°—42°.

30*th.*—Cleared off the roots of Tuberoses that have done flowering (those that were planted in July and August). The last flowers sold at $8.00 per 100 florets on the 24th inst. Could they have been kept until January 1st, they would have sold one-third higher. Cut flowers to-day in large quantities, to be made up in baskets and bouquets for New Year's Day. 26°—24°

31*st.* The same.

JANUARY, 1868.

2*nd.*—Put in scales of Lilium auratum and other Lilies. See "Propagation." Sowed seeds of Lobelia Paxtonii, Del-

phinium, and other plants suitable for bedding out for summer. 28°—32°.

3*rd.*—Repotted stock plants of Pelargoniums, Fuchsias, Lantanas, Petunias, etc., to encourage growth to produce cuttings. 29°—34°.

4*th.*—The same. 24°—28°.

6*th.*—The same. 14°—26°.

7*th.*—Repotted Fuchsias, Pelargoniums, Heliotropes, Petunias, etc., from 2-inch to 4-inch pots, to produce growth for spring sales. 20°—30°.

8*th.*—Large quantities of Verbenas, Heliotropes, Fuchsias, etc., are now put in the propagating benches, this being, perhaps, the best season to root cuttings, to give fine plants in May. 24°—32°.

9*th.*—Washed the soil from "pot bound" plants of Heliotropes, Pelargoniums, and similar plants grown in bench pots, and re-potted in fresh soil in pots of similar size. For detail of this method see Potting of Plants. 28°—14°.

10*th.*—The same. 4°—12°.

11*th.*—The same. 14°—18°.

13*th.*—First lot of Chrysanthemum cuttings put in from general collection. 10°—12°.

14*th.*—Shifted La Pactole and Safrano Roses that are forcing to produce winter flowers. 10°—20°.

15*th.*—The same. 14°—22°.

16*th.*—The same. 18°—22°.

17*th.*—Pricked out in shallow boxes, one inch apart, the seedling plants sown on the 2nd inst.. 12°—20°.

18*th.*—Potted off from propagating house struck cuttings of Petunias, Heliotropes, Variegated Geraniums, etc. 10°—22°.

20*th.*—The same. 20°—31°.

21*st.*—The same. 18°—34°.

22*nd.*—The same. 20°—14°.

23*rd.*—Potted Anemone Japonica from root cuttings put in on the 21st ult. 22°—18°.

24*th.*—Again potted off Verbenas in large quantities, and filled up the place occupied by them in the bench with cuttings. 19°—24°.

25*th.*—The same. 20°—18°.

26*th.*—Weather is steady and moderate, which is taken advantage of to ship plants to all parts of the country. Packing is done securely, so that almost every case is received in safety. See Chapter on Packing. 20°—22°.

28*th.*—All operations but firing and watering nearly suspended, in consequence of all hands being occupied in getting up orders and packing. 18°—24°.

29*th.*—Potted off Passiflora cærulea from root cuttings. Potted off in 2-inch pots Delphiniums and Lobelias that had been pricked out in shallow boxes on the 17th inst. 22°—28°.

30*th.*—Continued to pot rooted cuttings of Verbenas, Geraniums, etc., filling up the space by fresh cuttings as soon as cleared. 16°—12°.

31*st.*—Finished staking Roses to-day. 8°—16°.

FEBRUARY, 1868.

1*st.*—"Plunged" Roses in refuse hops to the rims of the pots. We find this a great saving in watering, besides keeping the roots in a uniform condition of moisture, conducive to healthy growth. 8°—16°.

2*nd.*—The same. 8°—16°.

3*rd.*—The same. 6°—4°.

4*th.*—The same. Zero—6°.

5*th.*—Cleared the benches of Eupatorium angustifolium which had done flowering, and filled up with spring stock. 4°—18°.

6*th.*—The same. 22°—28°.

7*th.*—Put in cuttings of Lantanas, Fuchsias, Antirrhinums, Petunias, &c. 22°—28°.

8*th.*—The same. 1° below zero—12°.

10*th.* —Cleared off Bouvardias that have been forcing for flowers, cutting off the tops and planting the roots closely together in shallow boxes, and placing them under the bench. Such roots make splendid plants for next season, or the roots may be cut up for propagation. 12°—8°.

11*th.*—The same.

12*th.*—Arranged plants on the benches where the Bouvardia and other flowering plants had been growing. Zero —26°.

13*th.*—Continued plunging Roses, as begun on the 1st inst., placing them, according to the size of the plant, at such distances apart as will allow the outside shoots to be an inch or so from each other. A house full of Roses in the dormant state when the pots are placed close to each other should fill, when thinned out, just about double the space, to give them sufficient room to grow. 20°—32°.

14*th.*—The same.

15*th.*—The same.

17*th.*—Put in cuttings of Phloxes and Chrysanthemums. 14°—32°.

18*th.*—Put in cuttings of Begonias, Stevias, Eupatoriums, etc., etc., to produce plants to grow in summer for next winter's flowers.

19*th.*—Cleared out Carnation plants that have been forced for flower. As such plants are of but little use after they have been thus forced, we find it most profitable to throw them away and replace them by young and fresh stuff. 22°—30°.

20*th.*—Pricked out rooted cuttings of Carnations 1 inch apart in shallow boxes, to economize space; we find that thus treated and planted out in the open ground they do quite as well as if they had been potted, and nearly one-half the space is saved. 30°—34°.

21*st.*—Put in large quantities of the leading bedding plants, such as Verbenas, Petunias, Heliotropes, Geraniums, etc., for succession crops. 36°—30°.

22*nd.*—The same. 26°—30°.

24*th.*—The same. 24°—16°.

25*th.*—Put in first Rose cuttings from young wood, of some new sorts which are scarce with us. It is too soon for the general crop. Finished thinning out and plunging Roses. 17°—22°.

26*th.*—Put in cuttings of Lantana, Variegated Geraniums, etc.

27*th.*—The same. 24°—30°

28*th.*—The same. 28°—26°.

29*th.*—First sowing of Tomato, Pepper, and Egg Plant seeds in shallow boxes for spring plants, in a night temperature of 65°. 22°—20°.

MARCH, 1868.

2*nd.*—Put in first cuttings of Dahlias, new Chrysanthemums, new Fuchsias, etc. 12°—10°.

3*rd.*—Pricked off seedling Petunias in shallow boxes 1 inch apart each way. Sowed Verbena seeds in shallow boxes; as they germinate slowly, care is taken to cover with finely-sifted leaf mould to the depth of $\frac{1}{8}$ of an inch, and sprinkle daily, so that they never get dry. Temperature at night 60° to 65°. Zero—4°.

4*th.*—Began to put in Rose cuttings in quantity, care being taken not to let the bottom heat exceed 65°, with an atmosphere of 10 or 15 degrees lower. See Propagation for further details. Zero—20°.

5*th.*—The same.

6*th.*—Potted off Pelargonium cuttings in fine order; they will make fine, healthy plants by May. 16°—33°.

7*th.*—We are now shipping large quantities. 32°—34°.

9*th.*—Put in cuttings of all sorts in large quantities. 30°—40°.

10*th.*—Second sowing of Tomatoes, Pepper, and Egg Plant seeds for succession. 32°—30°.

11*th.*—Put in Rose cuttings in large quantities. 36°—25°.

12*th.*—The same. 30°—30°

13*th.*—Pricked out in shallow boxes, 1 to 1½ inches apart, the Tomato and Pepper and Egg Plants sown on the 29th ult. Average work for one hand is about 3,000 plants per day. 36°—42°.

14*th.*—The same.

16*th.*—Put in cuttings of Dahlias, Fuchsias, etc. 42°—44°.

17*th.*—Potted off the Rose cuttings which were put in on the 25th ult.; an entire success. 40°—46°.

18*th.*—Placed young Carnation plants out in cold frames, to harden them off, preparatory to planting them out in the open ground. 38°—42°.

19*th.*—The same. 30°—40°.

20*th.*—The same. 30°—34°.

22*nd.*—Continued putting in Rose and Verbena cuttings in large quantities. 28°—30°.

23*rd.*—The same. 30°—42°.

24*th.*—Pricked out in shallow boxes the Zinnias and Asters, which were sown on the 6th inst. 30°—42°.

25*th.*—Now shipping largely. 30°—28°.

26*th.*—The second sowing of Tomatoes and Egg Plants was pricked out in boxes. Continued putting in Rose cuttings in large quantities. 30°—26°.

27*th.*—The same. 40°—44°.

28*th.*—Pricked out in shallow boxes the seedling plants of Verbenas that were sown on the 3d inst. 32°—38°.

30*th.*—The same. 30°—36°.

31*st.*—Potted off Rose cuttings that were put in on the 4th inst. 32°—48°.

APRIL, 1868.

1*st.*—The same. 23°—48°.

2*nd.*—Began to plant in the open ground Carnations

and Pinks that are to be kept for our own stock. (*Note.*—May 2nd. Since these have been planted, the ground has been frozen solid to the depth of 4 inches, or below the ball of roots, yet not a single plant is killed, or even injured. The Carnation, be it remembered, is almost a hardy plant, and if not raised too tender, will stand a great amount of cold without injury. Our lesson from this, then, is that, if we have plants in the necessary hardy condition, they may be planted out just as soon as the ground is dry enough to work with advantage in spring). 32°—30°.

3*rd.*—Potted off Verbenas, and continued planting Carnations outside. 30°—32°. (*Note.*—May 2nd. Those planted from the boxes show quite as well as those that had been grown in pots.)

4*th.*—Put in cuttings of Coleus, Lantanas, Bouvardia roots, and such cuttings as require the higher temperature that the brighter sunshine now gives. 30°—48°.

5*th.*—Began potting off a large quantity of Verbenas to-day; potted even at this date, they form splendid plants. 25°—34°.

7*th.*—Put in cuttings of Dahlias and Lemon Verbenas—the latter for next year's stock.

8*th.*—Continued making Rose cuttings and potting off such as are rooted. 45°—40°.

9*th.*—The same. 24°—36°.

10*th.*—The same. 28°—34°.

11*th.*—The same. 26°—32°.

13*th.*—Put in cuttings of Lobelia, Pyrethrum, and similar plants, for baskets and vases. 25°—30°.

14*th.*—The same. 40°—44°.

15*th.*—Put in cuttings of Pelargoniums, and Zonale, Variegated, and Rose Geraniums for stock. 50°—60°.

16*th.*—The same. 48°—52°.

17*th.*—Continued putting in Verbena and Rose cuttings and planted out Carnations in open ground. No Rose cuttings yet planted out, on account of a very wet spell

There would be no danger from frost now, were the ground sufficiently dry. 40°—44°.

18*th.*—The same.

20*th.*—Sowed Tomatoes for a succession crop. 44°—46°.

21*st.*—Put in cuttings of Double White Primula, for fall stock. 42°—48°.

22*nd.*—First planting of Roses in the open ground. Plants in very fine condition. They would have been planted 10 days ago if the ground had been fit. 46°—52°.

23*rd.*—The same.

24*th.*—Put in to-day 20,000 Verbena cuttings, which will be the last for this season, as they will not make good plants much later. These, however, will make very fine plants by the end of May. 32°—44°.

25*th.*—Put in cuttings of Dahlias and Double Geraniums. 40°—36°.

27*th.*—Selected the best Pansies, and planted them out for seed for stock. 40°—48°.

28*th.*—Planted out Roses. 36°—42°.

29*th.*—The same. 42°—46°.

30*th.*—Last Rose cuttings for the season made to-day later than this, it is uphill work propagating Roses, owing to the increased heat of the advancing season. 42°—60°

MAY, 1868.

1*st*—Planted out Lilies, Pæonias, and other hardy plants, in open ground. 42°—60°.

2*nd.*—Planted out in open ground seedling Verbenas from the boxes in which they have been pricked out, at distances of 18 inches between the rows, and 4 inches between the plants. They are put thus close to admit of rejecting inferior sorts as they flower. 46°—52°.

4*th.*—Pricked out Egg Plants from third sowing, (April 20th) and also potted those previously pricked out in boxes. Egg Plants being rather difficult to transplant,

we prefer to pot them, but there is no occasion to put Tomato or Pepper plants in pots. 46°—54°.

5*th.*—Potted off root cuttings of Bouvardia in large quantities. 48°—52°.

6*th.*—Planted out in the open ground stock plants of Variegated and Zonale Geraniums, the ones we have been propagating from all winter. 50°—53°.

7*th.*—Put in cuttings of Dahlias, and potted off such as are rooted. 50°—44°.

8*th.*—Put in cuttings of Lemon Verbenas for next season's stock, and potted off the last of Verbena cuttings for the season. 42°—52°.

9*th.*—Potted off a general assortment of bedding plants, mostly new, for our own stock. 46°—54°.

11*th.*—Planted out Roses largely. 48°—56°.

12*th.*—Potted off some Rose cuttings; there was some slight loss, owing to a rather high temperature. 46°—50°.

13*th.*—Potted off the Lemon Verbenas that were put in on the 7th ult.; found them too largely rooted, but had no room to pot off until now. They should have been potted 10 days ago. 52°—56°.

14*th.*—Put in cuttings of Chrysanthemums, Phloxes, and Lantanas, for plants for next fall and winter sales. 54°—55°.

15*th.*—The same. 50°—58°.

16*th.*—The same.

18*th.*—Potted off Geraniums, etc., etc. As we are running short of Egg Plants, have put in 1,000 of the tops as cuttings. 54°—56°.

19*th.*—Potted off Dahlias and Lemon Verbenas. 50°—54°.

20*th.*—The same. 52°—56°.

22*nd.*—Put in cuttings of Pelargoniums for fall and winter stock. 52°—56°.

23*rd.*—Potted off last lot of Rose cuttings for the season. 54°—64°.

25*th.*—Potted off Double White Primulas put in on the 21st ult., with a loss not exceeding 1 per cent. The last 6 days have been very wet. 58°—66°.

26*th.*—Planted out stock plants of Petunias, Calceolarias, Pentstemons, etc. 57°—68°.

27*th.*—Planted out Roses in large quantities to-day. 58°—56°.

28*th.*—The same. 54°—60°.

29*th.*—The same. 58°—64°.

30*th.*—The same. 62°—68°.

JUNE, 1868.

1*st.*—The same. 64°—68°.

2*nd.*—Potted off cuttings of Egg Plants that were put in on the 18th inst. 62°—66°.

3*rd.*—Potted last lots of Chrysanthemums, Phloxes, and Lantanas, that were put in on the 14th ult. 60°—64°.

4*th.*—Continued to put in Dahlia cuttings. 64°—68°.

5*th.*—Planted out our collection of hardy herbaceous plants. 66°—70°.

6*th.*—The same. 68°—72°.

8*th.*—Topped Carnation plants that were planted out on April 2nd, to keep them dwarf and bushy. 60°—64°.

9*th.*—Potted off Dahlias and Double White Primroses. 62°—66°.

10*th.*—Repotted stock plants of Double White Primroses. They are kept under glass during summer, and shaded by whitewashing the glass from May 1st to November 1st, heavier shading being given during the months of July and August. 54°—60°.

11*th.*—Shifted the Lemon Verbenas that were potted on May 13th from 2-inch to 4-inch pots, in which they will remain all summer. 64°—68°.

12*th.*—Washed the soil entirely from the roots of stock Pelargoniums, which have been exhausted by excessive

cutting for propagation, and potted in a size *smaller* pots. 66°—68°.

13*th.*—Planted out Bouvardias at the distance of 9 inches each way. 68°—70°.

15*th.*—Finished planting out Roses. 64°—66°.

16*th.*—Repotted La Pactole, Safrano, Hermosa, and other Roses, to be kept in pots during summer and fall, to force for flowers in winter. 62°—66°.

18*th.*—Planted out stock Dahlias. 66°—72°.

19*th.*—The same.

20*th.*—Planted out large Roses that have been left unsold. 78°—82°.

22*nd.*—The same. 60°—62°.

23*rd.*—The same. 60°—72°.

24*th.*—Planted out what remained of stock plants. 58°—64°.

25*th.*—Carnations have been much injured by continued rains; we observe that they are more susceptible of injury from wet than any other plant we grow. In anticipation of a dry, hot spell, we now mulch, to protect the few roots they may have left. 60°—68°.

26*th.*—Cleared out all plants from the green-houses, and placed them outside, except a few things, such as Double Primulas, Daphnes, Pelargoniums, etc., which would be injured by excessive rains. 60°—66°.

27*th.*—Repotted different kinds of plants that are kept in pots for winter, such as Chrysanthemums, Eupatoriums, Roses, Poinsettias, Heliotropes, etc. 64°—76°.

29*th.*—Potted off last lot of Pelargonium cuttings, for the season. 66°—74°.

30*th.*—The same.

JULY, 1868.

1*st.*—Repotted Roses for winter flowering. 68°—70°.

2*nd.*—Potted off Dahlia cuttings, the last for the season

later than this, the roots would hardly ripen sufficiently. 66°—68°.

3*rd.*—The same. 72°—72°.

6*th.*—Shifted Dahlias from 2 to 3-inch pots, where they will now remain for the season, care being taken, however, to thin out the shoots and lower leaves, to admit sufficient air to the roots to ripen the tubers. 72°—76°.

7*th.*—The same. 70°—70°.

8*th.*—The same. 72°—78°.

9*th.*—The same. 74°—76°.

10*th.*—Shifted Pactole, Safrano, and other Roses for winter flowering. 76°—80°.

11*th.*—The same.

13*th.*—Topped Carnations, to induce a dwarf growth and prevent them from exhausting themselves now by flowering, as the flowers are required only in winter. 82°—88°.

14*th.*—Weather exceedingly hot; nothing done but to water the plants and clean up. 76°—88°.

15*th.*—The same. 80°—90°.

16*th.*—The same. 88°—88°.

17*th.*—The same. 76°—80°.

18*th.*—The same. 88°—88°.

20*th.*—The same. 70°—74°.

21*st.*—The same. 72°—72°.

22*nd.*—Shifted Heliotropes, Chrysanthemums, Roses, &c., for winter flowering. 74°—76°.

23*rd.*—The same. 72°—74°.

24*th.*—The same. 72°—72°.

25*th.*—Planted out dry bulbs of Tuberoses on benches, in 5 inches of well-prepared, rich soil; these we expect to flower in December. Every alternate sash is removed from the green-house, so that they have almost full exposure to the open air. 76°—80°.

27*th.*—Repotted Stevia compacta and other winter-blooming plants. 74°—76°.

28*th.*—Layered in 2-inch pots Roses of some new sorts that are scarce. There is little loss in layering Roses if it be done in small pots sunk in the soil. 66°—74°.

29*th.*—The same.

30*th.*—Shifted Cyclamens and Double White Primroses, and thinned out the Primroses, spreading them over a larger surface, to admit air around the pots. 68°—74°.

31*st.*—The same. 70°—74°.

AUGUST, 1868.

1*st.*—Second planting of Tuberoses in the manner done on the 25th ult. Will endeavor to retard this lot by keeping the soil as dry as possible, the great object being to delay the flowering until January. 72°—78°.

3*rd.*—The same.

4*th.*—The same. 72°—78°.

5*th.*—To-day we pot dry roots of Tuberoses, placing them in a cool shed and keeping them *dry*. They can be thus kept in a shed for 10 or 12 days, after which they must be exposed to the open air, but will still be kept as dry as possible until they begin to grow. They will be thus kept in pots (2 roots in a 6-inch pot,) until there is danger of frost, when they will be planted out in soil on the benches as the others are. The object of potting them at all is that their removal to the benches can be done without injury to the roots, which could not be effected unless they were first potted. If we had planted them at once in the bench we do not think we could keep them back so well, as by placing them in a partially shaded place in the open air.—Cut over for the last time this season those Carnations that are wanted to produce flowers in December and January. 70°—76°.

6*th.*—Shifted winter-flowering plants of all kinds. 70°—78°.

7*th.*—The same. 70°—76°.

8*th.*—The same. 72°—74°.

10*th.*—Potted off cuttings, and shifted into larger pots, Chrysanthemum laciniatum (the winter-flowering variety). 72°—76°.

11*th.*—The same. 74°—78°.

12*th.*—The same. 60°—64°.

13*th.*—Put in green cuttings of Bouvardia, Cissus, &c. 54°—60°.

14*th.*—Shifted for the last time this season Roses that are to be used for winter flowering. 55°—62°.

15*th.*—The same.

17*th.*—Shifted Eupatoriums, Stevias, Poinsettias, and other winter-flowering plants, for the last time this season. The next shifting will be from the pots to planting out in the benches. 66°—74°.

18*th.*—Washed the soil from the roots of Roses that have become "pot bound," and repotted in new pots with fresh soil. This practice we find very effectual to recuperate all plants that have been stunted by any cause whatever. 64°—72°.

19*th.*—Topped Bouvardias, to keep them dwarf and delay the flowering until the winter months. 70°—80°.

20*th.*—The same. 75°—72°.

21*st.*—The same. 72°—70°.

22*nd.*—The same. 68°—70°.

24*th.*—Layered new sorts of Roses in pots, and put in green cuttings of Bouvardias, Cissus, Clerodendrons, and other plants of a tropical nature. (*Note.*—September 5th. This resulted successfully). 70°—76°.

25*th.*—Cut down stock plants of Pelargoniums, and put in the shoots as cuttings. The Pelargoniums have been kept under glass all summer, slightly shaded, and have ripened their shoots finely, so that, no doubt, nearly every cutting will grow. Great difficulty is always found with the rooting of Pelargoniums that have been planted out. The cut-down plants will, of course, receive no water until they begin to grow. 68°—74°.

26*th.*—The same. 68°—74°.

27*th.*—Repotted Poinsettia, Heliotrope, Eupatorium elegans, and stock plants of Lantanas, for the last time until they are placed in winter quarters. 64°—72°.

28*th.*—Shook out and overhauled stock Fuchsias that have been injured by exposure outdoors to heavy rains. 62°—75°.

29*th.*—The same.

31*st.*—Cut down stock Heliotropes and put in the cuttings. 70°—74°.

SEPTEMBER, 1868.

1*st.*—Potted off cuttings of new Bouvardias that were put in on the 13th inst., only about one-half of which have rooted, owing to too high a temperature. 72°—80°.

2*nd.*—Shifted Safrano and other Roses thus early, so that they may become sufficiently rooted in the pots to force for winter flowers. 65°—70°.

3*rd.*—Cut back Petunias, shrubby Calceolarias, Centaureas, &c., to produce young shoots for cuttings, which they will do by the end of the month. The hard growth of the flowering shoots, or even the ordinary growth of the blind shoots made in summer, is too hard for the purpose. See the necessary condition of the cutting in Chapter on Propagation. 56°—60°.

4*th.*—The same. 50°—61°.

5*th.*—Lifted and potted Bouvardias from the open ground and placed them against a north wall outdoors. Careful attention is necessary in shading and watering until they begin to root. 55°—58°.

7*th.*—The same. 64°—62°.

8*th.*—Put in cuttings of Mrs. Pollock and other golden tricolor Geraniums in propagating house. The propagation of all classes of Geraniums will now be continued from the plants growing outdoors, from now to the end of the month. The plants of such as are wanted for stock are lifted and potted, as soon as cut down for cuttings. 60°—61°

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